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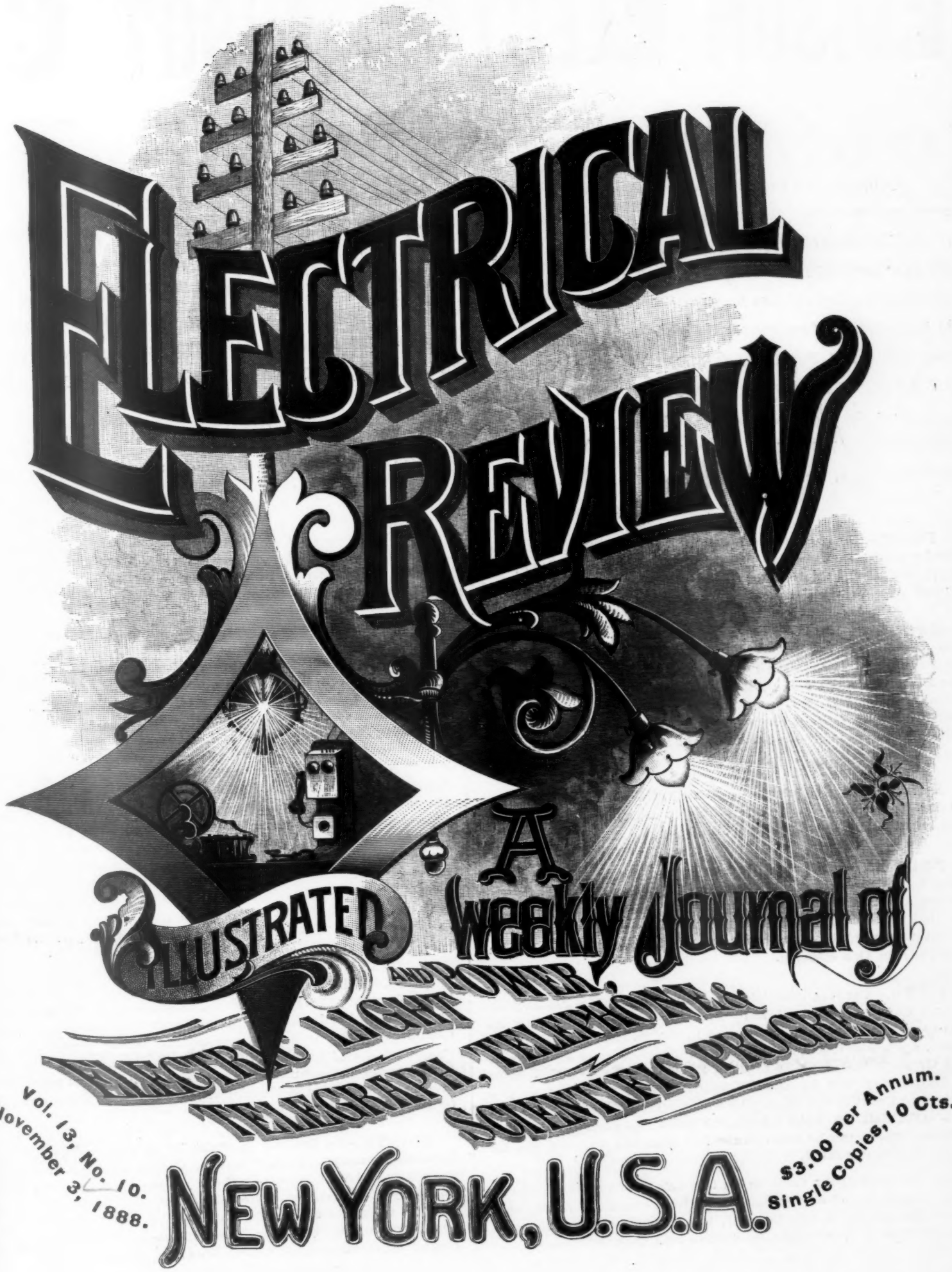


Vol. 13, No. 10.
November 3, 1888.

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# EDISON ELECTRIC LIGHT CO.

*So much has been said in relation to PATENT DECISIONS, and we have been so urgently and repeatedly requested to refute the misstatements and misrepresentations of electrical companies who have been in the habit of rushing into the Press upon any and every slight pretext, that we have decided to give a brief synopsis of the facts. In the preliminary movements of the legal campaign which we have inaugurated for the protection of our patents, the defendants have pursued only dilatory and evasive tactics, notwithstanding their pretense of anxiety to have the fight conducted in an open field and the issue determined on its merits. The potent fact still remains that NO ONE OF OUR THREE HUNDRED PATENTS HAS EVER BEEN SET ASIDE OR ADJUDICATED IN ANY COURT OF LAW IN THE UNITED STATES.*

*The decisions actually rendered in the Courts of Europe and America are thirteen in number, of which ELEVEN HAVE BEEN IN FAVOR OF THE EDISON PATENTS and only two against them: and these two, as will be shown, were purely of a preliminary character.*

**FIRST.**—The fundamental or "filament" patent on the lamp has been sustained six times in Germany after a very closely and hotly contested litigation and in the face of the most stringent patent laws in the world.

**SECOND.**—Some two years ago the English Edison Company brought suit against Woodhouse and Rawson and after a bitter controversy in the English Court, Mr. Justice Butt sustained the Edison filament patent, and his decision, based as it was on a question of fact, has now become famous as establishing beyond question of doubt the priority of Edison's right to the only commercially practicable incandescent lamp, viz: "a filament of high resistance."

**THIRD.**—The defendants in the above-mentioned suits appealed from the decision of Mr. Justice Butt, but his decision was affirmed by the Appellate Court.

**FOURTH.**—A suit was brought by the English Edison Company upon a patent which describes a process of building up carbon conductors by electro-chemical action. This suit was decided in favor of the English Edison Company, but the process is not now used in the manufacture of its lamp by the Edison Company in this country.

**FIFTH.**—The recent decision of Judge Kay against the English Edison Company involved the "filament" patent, the same as was covered by the suits mentioned in the 2d and 3d paragraphs above, upon which patent all previous decisions, both in England and Germany have been in favor of Edison. The adverse decision of Judge Kay will be immediately appealed from and as the Appellate Court is the same which has already decided IN EDISON'S FAVOR ON THE SAME PATENT (see paragraphs 2 and 3 above) there can be little doubt but that the decision will be again in Edison's favor.

In this country no decision on this important patent has ever been rendered, and as the English decision could not in any way affect the patent in this Country, the recent attempts, through the medium of newspaper interviews and correspondence, and otherwise to give the impression that ANY Edison American patent is invalidated in consequence of Judge Kay's decision bear the stamp of intentional misrepresentation.

**SIXTH.**—In the suits brought by us against the United States Electric Light Company in the New York Courts, the defendants set up a plea that certain foreign patents upon the same invention had expired and that in consequence the American patent is void. We demurred to this plea, but Judge Wallace decided against us, and the defendants will now be compelled to defend themselves against our next and more serious onslaught, in which we propose to prove that the foreign patents HAVE NOT EXPIRED. Even should we fail in establishing this question of fact, we shall then be prepared to show that by a proper and equitable interpretation of the statute the expiration of a foreign patent does not invalidate the American patent. This latter we hold to be an absolutely impregnable position, constructed of the material essence of all equitable law and common sense. It will be seen from the foregoing that instead of having won the twenty-six suits, as is so audaciously claimed by the unscrupulous officers of the United States Company, they have merely won an incidental plea, which gives them a foot-hold upon the battle-field. The real fight has as yet not begun.

**SEVENTH.**—In the suits brought by us against the Westinghouse Company in Trenton, N. J., they moved to dismiss our bill on the ground that the old Edison Company (prior to its consolidation with the Isolated Company), in whose name the suits were filed, has, by means of that consolidation, not sufficient life to prosecute these suits. Judge Wales decided this point in our favor,and therefore the Westinghouse Company are now compelled to meet the issue squarely.

**EIGHTH.**—In the suit brought by us against the Thomson-Houston Company in New Haven, Conn., after similar tactics were pursued, the claim was there set up that the new Edison Company in whose name the suits were filed, had not sufficient title to maintain them. Judge Shipman decided this point in our favor, and the Thomson-Houston Company are therefore now compelled to answer the charge of infringement.

## EDISON ELECTRIC LIGHT CO.,

**16 & 18 BROAD STREET, NEW YORK.**

*By EDWARD H. JOHNSON, President*

# ELECTRICAL REVIEW

ILLUSTRATED.

A WEEKLY JOURNAL OF

## Electric Light, Power, Telephone, Telegraph and Scientific Progress.

VOL. 13, No. 10. WEEKLY. NEW YORK, SATURDAY, NOVEMBER 3, 1888. $3 per annum. Single Copies, 10 Cents.


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### Rewards for Meritorious Discoveries and Inventions.

TO THE EDITOR OF ELECTRICAL REVIEW:

The Committee on Science and the Arts of the Franklin Institute, of the State of Pennsylvania, respectfully requests that you will cause to be made known to the readers of your influential journal, the fact that the committee is empowered to award, or to recommend the award of certain medals for meritorious discoveries and inventions, which tend to the progress of the arts and manufactures.

These medals are:—

1.—THE ELLIOTT CRESSON MEDAL (GOLD).

This medal was founded by the legacy of Elliott Cresson, of Philadelphia, and conveyed to trustees of the Franklin Institute. By an Act of the Institution, May 17, 1849, the Committee on Science and the Arts was designated and empowered to award this medal, and the committee decided to grant it, after proper investigation and report by sub-committee, either for some discovery in the arts and sciences, or for the invention or improvement of some useful machine, or for some new process, or combination of materials in manufactures, or for ingenuity, skill or perfection in workmanship.

2.—THE JOHN SCOTT LEGACY PREMIUM AND MEDAL—TWENTY DOLLARS AND A MEDAL OF COPPER.

The John Scott Legacy Premium and Medal was founded in 1816, by John Scott, a merchant of Edinburgh, Scotland, who bequeathed to the City of Philadelphia a considerable sum of money, the interest of which should be devoted to rewarding ingenious men and women who make useful inventions. The premium is not to exceed twenty dollars, and the medal is to be of copper, and inscribed "*To the most deserving.*"

The control of the Scott Legacy Premium and Medal (by Act of 1869) was transferred to the Board of Directors of City Trusts, and referred by the Board to its Committee on Minor Trusts, and that committee resolved that it would receive favorably the name of any person whom the Franklin Institute may from time to time report to the Committee on Minor Trusts, as worthy to receive the Scott Legacy Premium and Medal.

The Franklin Institute, by resolution in 1882, accepted the above-named action of the Committee on Minor Trusts, and referred the duty of making such recommendations to the Committee on Science and the Arts. The committee determined that the recommendation for such reward shall be made on the favorable report of a sub-committee which shall be appointed to examine the invention or discovery.

The committee requests your co-operation in facilitating the making of the aforesaid awards for meritorious discoveries and inventions, by bringing the facts herein set forth, to the knowledge of your readers.

Upon request therefor, from interested parties, made to the secretary of the Franklin Institute, full information will be sent respecting the manner of making application for the investigation of inventions and discoveries; furthermore, the Committee on Science and the Arts will receive and give respectful consideration to reports upon discoveries and inventions, which may be sent to it with the view of receiving one or the other of the awards herein named and full directions as to the manner and form in which such communications should properly be made, will be sent on application.

By the Committee's order,

WM. H. WAHL, *Secretary.*

The Franklin Institute, Phila., Oct. 1.

### Combination Floor Key and Movable Table Button.

Electrical and mechanical combinations are the order of the day. In the cut presented herewith, we have a neat and very available arrangement designed and manufactured by the Central Electric Company, Chicago. The illustration shows a regularly formed floor key with a fibre instead of a brass flange. When the contrivance is to be used as a table push button, the brass connecting pin is removed and the fibre disc with attached cord substituted by pressing it over the head of the floor key. Contact is now formed through pressure of the brass springs on the metal portions of the fibre disc. Now, when the table button is pressed the circuit is closed and the bell rings.

AN INGENIOUS ELECTRIC CALL.

### Electric Fruit.

[From the *Terre Haute Express.*]

"George, dear, what kind of fruit is borne by an electric light plant?" "Electric currents, of course."

### A Word of Appreciation from the President of the Clark Electric Co.

TO THE EDITOR OF ELECTRICAL REVIEW:

In your issue of Oct. 27th I notice your solution of the "underground problem." Your proposition to place the steam pipes overhead is a good one, and especially for the purpose that you mention. I am sure the Commissioners will feel under obligation to you for this original thought.

JAMES H. SEYMOUR.

159 Chambers St., N. Y.,
Oct. 27th, 1888.

### Election Returns at the Electric Club.

The Electric Club will be a center of political interest Tuesday afternoon and evening, Nov. 6th. Arrangements have been made to receive the election returns from all over the country, through the courtesy of the Long Distance Telephone people, who have consented to place one of their improved cabinet telephone sets in the front parlor. The politicians of the electrical fraternity will no doubt be present in numbers, and will have ample opportunity for expressing their views as the returns come in. To see that the discussion never reaches that political climax, so often occurring in political discussions, a sweet-oil-pouring and pacifying committee, composed of three athletic six-footers, Mr. Eugene T. Lynch, Jr., Stephen D. Field and Frank Ridlon, have been requested to act, and they will undoubtedly discharge the duties of their position with intelligence and dispatch.

The presiding officers of the evening when news begins to come in lively, will be Capt. Willard L. Candee of the 23d Regiment, N. G. S. N. Y., and Dr. Otto A. Moses, thus giving to each candidate of the two leading national parties a representative, which will probably be taken as an indication that the Electric Club is about evenly divided in its political affiliations.

We understand that no speeches will be permitted of greater duration than five minutes and these must all be delivered after the polls have been closed, to prevent the electrical eloquence from prejudicing any of the voters; another indication of the impartial position of the Club politically. Lieut F. W. Toppan, U. S. N., Mr. Wm. S. Hine, Mr. George M. Phelps and others are expected to be present and welcome the encouraging news impartially with song and music.

The elegant silver punch bowl, presented to the Club by Capt. H. R. Garden, will be on duty that evening and will supply the thirsty visitors with the best lemonade to be had in the city.

A special dinner will be provided for that evening, continuing from 6 to 8 P. M., and by a notice posted on the Club's bulletin board, all who expect to be present that evening for dinner are requested to notify the clerk, so that ample provision can be made for all.

The phonograph-graphophone will be in use at the Club that evening, and may be seen and tried by all who desire.

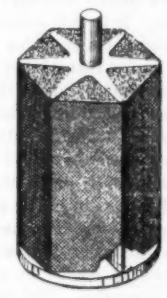
### An Expensive Telegraph Line.

[From the *Washington Star.*]

The telegraph line from Poplar River to Fort Maginnis, in the Department of Dakota, 232 miles in length, is the most costly of all the telegraph lines connected with the military service. The intervening country is wild and desolate in the extreme and generally without inhabitants, so that at Galpin, the repair station, this service is obliged to maintain, at an expense of $1,630 per year, two civilian repairmen, since one will not live there alone. The total receipts from the line during the past year were $155.17, while the cost to the Government for maintaining and operating the section is over $4,000 annually.

### Improvements in the Leclanche Battery.

The illustration below represents a view of a new battery electrode, a patent for which was recently issued to Mr. H. J. Brewer, of the Leclanche Battery Company, New York.



The claim is for a battery-electrode comprising a conductor having projections, a bag or envelope fitting over said projections to form pockets, and an electro-negative material packed in the said pockets between the said bag and the conductor.

### Motors and Music.

On Tuesday afternoon last, despite the mud and drizzle which made New York anything but agreeable for foot passengers, quite a goodly number of prominent electrical gentlemen, together with many leading organists and church men, gathered in St. Paul's Chapel, New York, to witness the C. & C. electric motor furnishing power for the church organ. An accomplished organist was in attendance and rendered many selections. In the rear of the organ a one horse power C. & C. motor was attached to the blowing apparatus in such a way that the air pressure threw a belt off and on a loose pulley. The whole apparatus worked admirably and responded instantly to the demands upon the instrument. Messrs. H. C. Lufkin and G. S. Mumford, both of the C. & C. Electric Company, were present, and explained the very evident advantages of electrical power for this class of work. The C. & C. motor has been in successful operation at St. Paul's Chapel for about three months.

### Theatrical Electrical Work.

The Columbia Theatre, of Chicago, thoroughly overhauled from stage pit to gridiron, re-furnished and beautified, opened on the 1st of October, and gave its patrons "The Queen's Mate," to continue for a season of five weeks.

The electric devices for the play are somewhat different from anything we have seen before, and include a lot of arc lamps on the stage in one of the scenes.

The architect of the Columbia being exceedingly desirous of placing an arc light in the center-piece over the parquette, but hidden by an inclosure of ground glass, asked permission of the inspector. Now, from the stage to that light is something less than half a mile, and all up-hill at that. So the city inspector very positively refused to permit it, at first, but finally yielded after having suggested that the wooden portion of the "well" should be lined with asbestos and tin, and a thermostat be placed on a wire running to the stage, with a vibrating bell and battery in circuit. A switch in easy reach from the light man on the stage will be thrown and extinguish the lamp, when the bell gives the alarm.

Those who have seen the device agree in the opinion that it is a very cheap way of accomplishing a goodly amount of protection in a very simple way.

## The Electrical Subways of New York.

The Western Union Telegraph Company states that the subways which had been constructed along the line of the Steam Heating Company's pipes are practically useless for its purposes, and that the heat from the steam destroyed the cables. The Board of Electrical Control, of New York, was then brought face to face with this problem, and a very difficult one, on the question of building subways for electric wires. The expert of the Board, who was called on for an opinion on the complaint, is reported to have said that some immediate action in the matter seemed necessary, either by requiring the telegraph company to use a better quality of cable, stopping the Steam Heating Company from using the streets for the purpose of carrying steam, or by cooling the conduits by a constant circulation of air through them.

An expert apparently familiar with the subject, gives his opinion in the *Evening Post*, as follows:

"The recommendation of the expert to the Board that the company be required to use a better quality of cable, can be scarcely carried out. It is well known that the very best insulating material for these cables is guttapercha, but that it is very easily affected by the heat and is out of the question. It does not seem as if the Board could force the companies to use a cable which would resist heat, when they have so much difficulty now in overcoming the danger from water and induction. The proposition that the Steam Heating Company be stopped is ridiculous, and the third suggestion, that the conduits be cooled by a circulation of air, is too expensive. The best thing to do would be to construct a subway which would answer the purposes required of it.

"The trouble is that the Board has built a subway to hold electric wires, and have not considered the difficulties to be overcome before the wires can be used successfully. From the ill-success the companies trying to use the subways have met with, it seemed that the construction company dug a trench in the ground, not caring particularly where, laid iron pipes in hydraulic cement, and invited the electric companies to put their wires there instead of on poles in the air. The move has not been successful and I cannot see how it will be. All these subways appear to be unfitted for the use expected of them. It is very probable that the whole lot of underground conduits will have to be abandoned.

"The best thing to be done now is for Mayor Hewitt to step in as he did in the case of the Aqueduct Commission, and call upon the Legislature to undo the work they have done. The companies were directed to put their wires under ground some time ago. They did not do anything, and then the Board of Electrical Control was given power to build subways. This has been done, and just at present the results are anything but satisfactory. Instead of calling upon the best electricians they could find, laying out a plan which would cover the whole city, and then experimenting on the best kinds of subways; taking into consideration the distribution from the subways, and, in fact, solving the electrical problem before building; the Board has gone ahead in a blind manner with the prospect of having the work to do all over again. What is wanted is a practical working subway. The whole thing should be put into the hands of the city, and some such man as Gen. Newton should be at the head of it. He could get together the best electrical experts, discuss the plans offered fully, and when a decision was arrived at, carry it out at the lowest possible cost. Until something of that kind is done, the streets will be as disfigured with wires as they are now."

Mayor Hewitt said that he had stated his position over and over again, and he would never sanction the building of an expensive and useless subway which the city would eventually have to pay for. The electrical problem was a great one, and no one could tell the uses electricity would be put to. He thought it was folly for the Board of Electrical Control, as at present constituted, to attempt to put the wires under ground until they had some idea of what they were going to do. So far they had no system. What they had done was wrong, and spending money in that direction further was useless. From what he had read about underground wires in Berlin, it seemed to him that it was a question of insulation there. The companies had laid properly insulated cables in the ground, and during the past six months the success had been unquestioned. He believed that all the wires could be put under ground and worked successfully, but did not think the Board of Electrical Control had yet solved the question.

—— The palace of the King of Roumania, at Sinaia, is lit throughout by electricity, motive power being derived from a mountain stream in the immediate neighborhood. The following story is told of this:

"I happened to be in the Palace of Sinaia when the electric light was being exhibited to the King on trial. The representative of the English firm who was setting up the installation was an exceedingly voluble person, and he was explaining to his Majesty at great length all the advantages which the electric light enjoyed over gas. It did not tarnish gilt, it did not consume or vitiate the air, it could be turned on or off at any moment; there was no occasion to use matches, and greatest advantage of all, it minimized the chances of fire, and absolutely gave out no heat. The King listened with great attention, and was evidently much impressed, but just as the voluble gentleman was mentioning the fact about there being no heat, he placed his hand at the bottom of one of the lamps, and even the royal presence could not restrain an exclamation of pain—he had burnt his fingers with the heated metal. Seeing this, the King gingerly touched the lamp in turn, and he too got a slight burn. He smiled grimly, and turning to the electrician said: 'Hum, well, I hope, Mr.——, all the other advantages of the electric light are not so apocryphal as this.' But he decided to have it installed all the same."

The Jarvis Engineering Co., 61 Oliver street, Boston, have just closed contracts with the following concerns to furnish Armington & Sims engines: Wm. Knowlton & Sons, West Upton, Mass., one 50 h. p.; Newton Electric Light & Power Co., Newtonville, Mass., one 100 h. p.; E. & T. Fairbanks, St. Johnsbury, Vt., one 100 h. p.; Consolidated Electric Light Co., Portland, Me., one 90 h. p.; Hyde Park Electric Light Co., Hyde Park, Mass., one 100 h. p.; Edison Electric Illuminating Co., Boston, Mass., one 135 h. p.; Hotel Vendome, Boston, Mass., one 40 h. p.; New Haven Electric Co., New Haven, Conn., two 90 h. p.; Bridgeport Electric Light Co., Brideport, Conn., two 90 h. p.; Boston Electric Light Co., Boston, Mass., six 90 h. p.

## Electric Launches.

We learn, says the London Electrician, that Messrs. Tagg & Son, of the Island Works, East Molesey, have received orders to construct five electric launches, each 35 feet in length, for Messrs. Immisch & Co. Another launch, designed and built for the same firm, by Mr. W. Sargeant, of Chiswick, has just been completed. The launch is 65½ feet long, with 10 feet beam and is designed to carry 80 passengers, with a mean draught of 22 inches, 12½ tons displacement at six miles an hour as regulated by the Conservancy by-law. The electrical machinery and storage being placed below the deck, fore and aft, leaves a clear run the whole length of the boat for passengers. In the middle is a handsomely fitted cabin with lavatories, dining table etc. 200 E. P. S. accumulators are placed on board, and supply current for two motors of 7½ h. p. each, driving twin three-bladed propellers, by Thorneycroft & Co. The hull is constructed with primary view to comfort of passengers and is of bright mahogany and teak throughout.

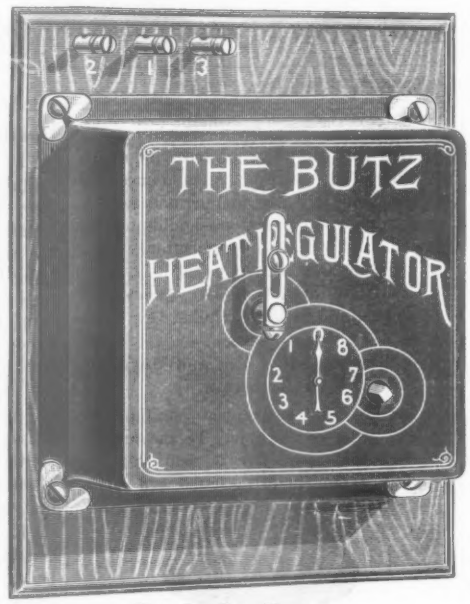



FIG. 3.—THE MOTOR.

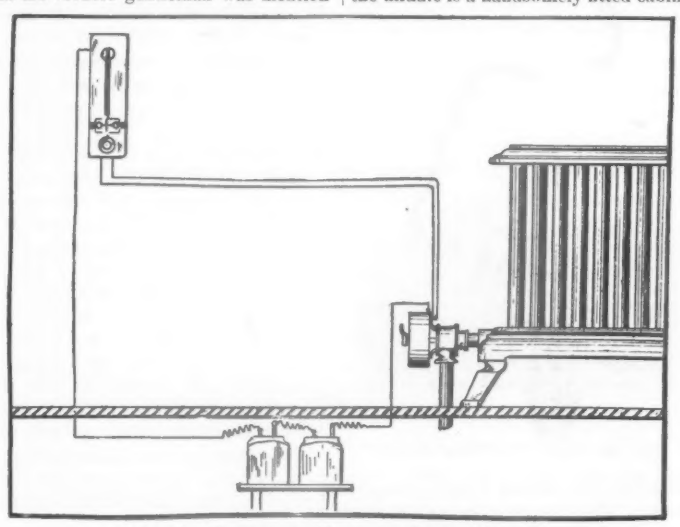


FIG. 4.—AUTOMATIC ELECTRIC STEAM VALVE.

## The Boulton Carbon Case.

Mr. W. H. Boulton has been enjoined by Common Pleas Judge Hamilton, Cleveland, Ohio, from conducting his business under the name of the Boulton Carbon Company, or advertising under that name to the effect of that he produces the only reliable Boulton carbon. He gave notice of an appeal to the circuit court and was given thirty days in which to prepare a bill of exceptions. The appeal bond was fixed at $5,000.

—— At the Wednesday evening meeting of the Pawtucket City Council a message was read from Mayor Goodwin vetoing the ordinance passed in May and concurred in by the aldermen in September, relating to the construction of an electric light plant for the use of the city and making an appropriation therefor. The message is an exhaustive one and the Mayor has evidently given much thought to the matter. It is the first veto in the history of the city.

## "Soothing the Cylinder."

An enthusiastic writer in giving his opinion of the merits of the phonograph, presents the following as opening up a new and valuable field for this interesting instrument. In point of weight and inconvenience of carrying, the phonograph cylinder would undoubtedly have the preference. The gentleman, Mr. E. D. Easton, of Washington, says:

"I now correspond in this way daily with my wife and family, who are away from Washington. Often the children, too small to write, send messages; as do friends who call and see the wonderful talking machine. Even the crying of the baby is at times reproduced so perfectly that tender-hearted hearers are inclined to take the cylinder from the machine and walk the floor in an endeavor to soothe the little one: and when listening to familiar voices it is difficult to resist an inclination to respond, so naturally are the tones reproduced."

## The Electric Light at Savannah, Ga.

The company in the city of Savannah, which Mr. S. P. Hamilton is president, was organized in 1882. It began operation with one 40-light dynamo for arc lights. The capacity has since been increased to 180 lights. Last year the Westinghouse system of incandescent lights was introduced, the company putting in a 650-light dynamo. It has now four of these dynamos permitting the introduction of 2,600 incandescent lights. The capacity in the winter time is fully taxed, and arrangements are being made for the introduction of new dynamos and the extension of the system to the southern residence portion of the city. Recently a fine new 125-horse power engine was placed at the works, and a boiler is now being put up.

The incandescent lights are of 16, and the arc lights of 2,000, candle power, giving a total illuminating power at present equal to more than 400,000 candles, or about 25,000 gas jets.

## Electric Temperature Regulators.

The Consolidated Temperature Controlling Company, of Minneapolis, Minn., are manufacturers who realize the great assistance electricity supplies in automatically regulating temperature. The improved systems of heating by means of air, steam and water are admirably controlled by the apparatus of this company, views of which we are pleased to present to our readers in this issue.

No argument is needed to remind one of the constant care required in regulating the fires throughout the winter, to say nothing of the actual labor employed, and the large amount of fuel wasted in the attempt to keep the home comfortable. Many of the colds and other illnesses of the family, are directly traceable to the irregularities of temperature which of necessity prevail more or less in the home during the rigors of a northern winter.

Night and day, from autumn till spring, the automatic electric regulator controls the heater and maintains whatever temperature may be desired in the living rooms of the house. With it there can be no fires from overheated flues, no bursted water pipes, nor frosted house plants. If the temperature rises a degree too high, the regulator instantly closes the furnace drafts and opens a check-damper in the smoke-pipe. As soon as the temperature falls a degree too low, the regulater opens the drafts and closes the check damper. The regulator may be adjusted for any desired degree of temperature, which may be changed in a moment, and as often as desired, and the regulator will immediately respond to each varied requirement.

The Regulator consists of a thermostat, or mechanical thermometer that is placed in the room or apartment whose temperature is to be regulated. This thermostat is connected by electric wires with an ordinary open-circuit battery which may be placed in the furnace room or basement. A strong spring-motor is arranged near the furnace. This motor is connected with the front and check-dampers of the furnace so that as one damper

is opened the other is closed. The electric wires from the battery and thermostat connect with the motor.

In Fig. 1 is shown the regulator applied to a hot air furnace; in Fig. 2, as applied to a steam heater. In the former the thermostat is shown secured upon the wall in one of the rooms of the house. The electric wires are

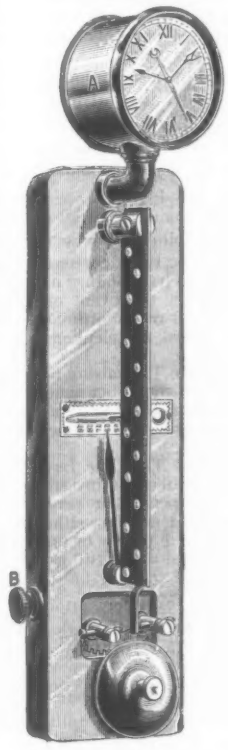


FIG. 6.—AUTOMATIC SWITCH THERMOSTAT.

connected with the thermostat and may be run usually in the wall to the basement or furnace room. The thermostat is located in any room in the house, and at any distance from the furnace. The motor may be located preferably directly over either the check-damper or the front damper, A chain is run from the crank on the motor shaft to the

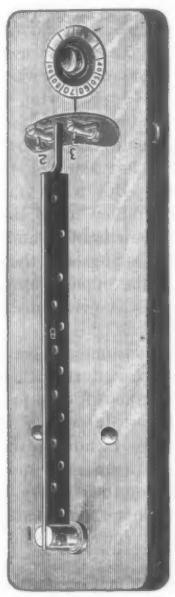


FIG. 5.—THE THERMOSTAT.

front damper, and one to the check damper. One damper opens as the other closes, and the dampers thus balance each other. The battery is placed on a shelf, at any convenient point. One wire runs from the thermostat to one pole of the battery, two wires from the thermostat directly to the motor, and another wire runs from the battery to the motor. The thermostat may be set for any desired temperature. The motor shown in Fig. 3, is provided with a patent index that shows when it needs re-winding, with an automatic circuit-breaker which breaks the circuit should the motor accidently be allowed to run entirely down, thereby preventing the polarizing of the battery, and with a patent stop that prevents winding up too far.

The different forms of thermostats and the the application of the regulator to buildings heated by steam pipes are shown in the other illustrations, the whole comprising a complete and practicable system.

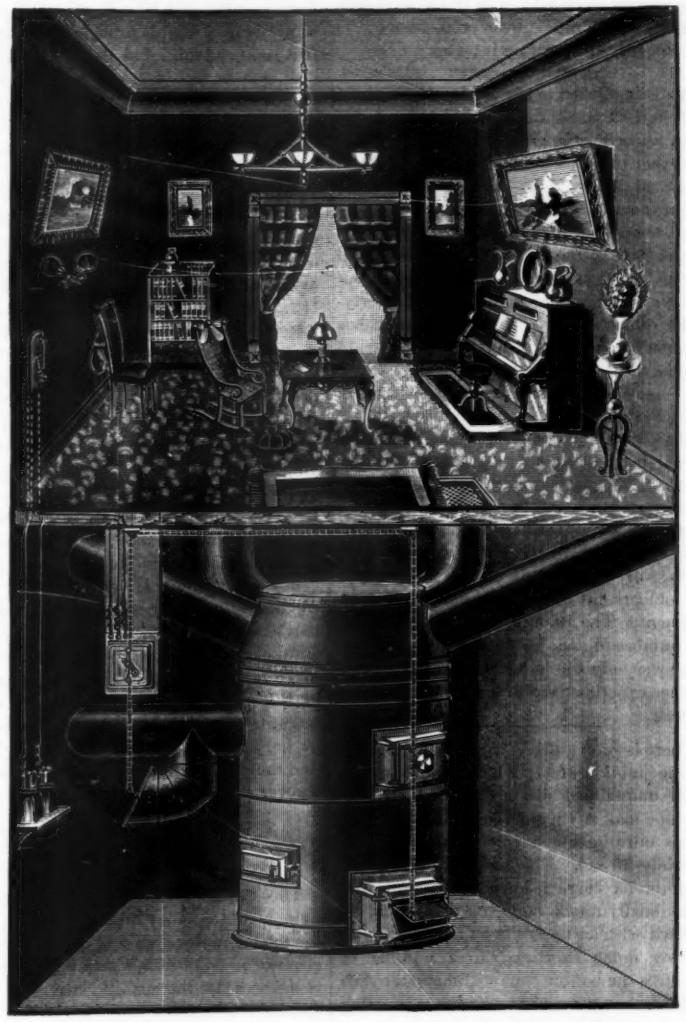


FIG. 1.—ELECTRIC TEMPERATURE REGULATOR APPLIED TO HOT AIR FURNACE.

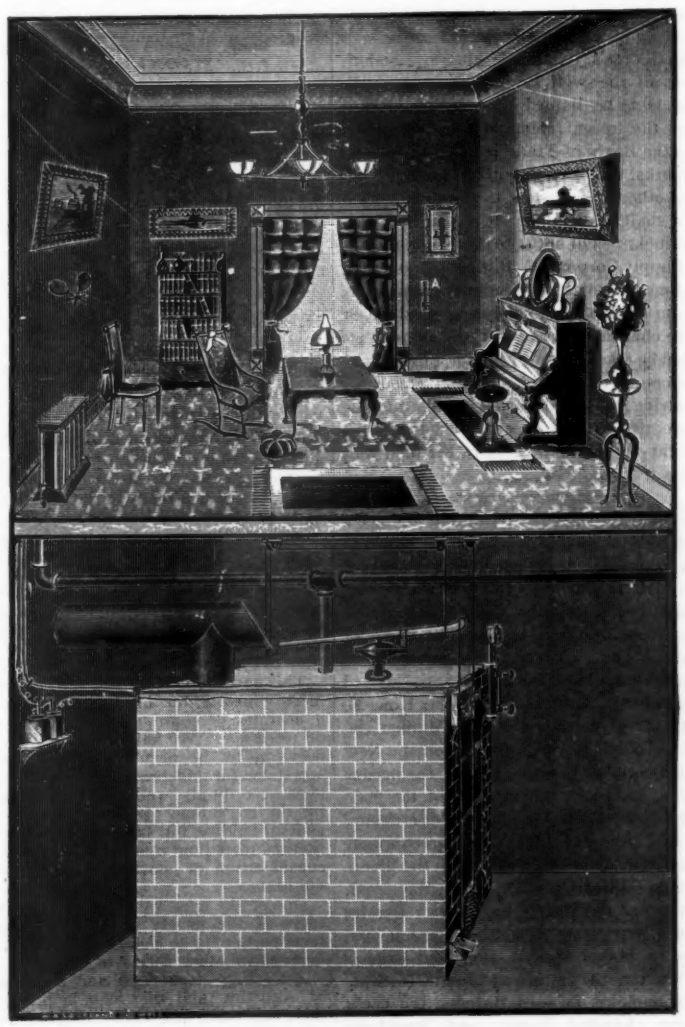


FIG. 2.—APPLIED TO STEAM HEATER.

**Cincinnati, O.**—The Ohio Valley Electrical Company. Capital, $50,000. J. G. Schmidlopp and others, incorporators.

**Erie, Pa.**—The Erie Electric Motor Company, of Erie. Capital stock, $400,000. Incorporators, S. T. Everett and others.

**Kansas City, Mo.**—The Western Electric Lock Company. Capital stock, $100,000. Benjamin F. Jones and others incorporators.

**Covington, Ky.**—The Columbus Telephone Company, of Covington. Capital stock, $10,000. Incorporators, J. P. Dietler and others.

**Hempstead, N. Y.**—The Metropolitan Phonograph Company, Hempstead. Capital, $1,000,000. Andrew L. Taylor and others, incorporators.

**Alton, Ill.**—The Alton Gas and Electric Light Company at Alton. Capital stock, $600,000. Incorporators, Alva E. Campbell, John Watt, Levi Davis, Jr.

**Chicago, Ill.**—The Universal Heating Company, at Chicago. Capital stock, $50,000. Incorporators, Lewis K. Curlett, Henry Boyce, W. Knox Haynes.

**Chicago, Ill.**—The Fox Solid Pressed Steel Company at Chicago. Capital stock, $500,000. Incorporators, Charles S. Holt, Colvin C. H. Fyffe, Arthur D. Wheeler.

**Rutherford, N. J.**—The New York & New Jersey Automatic Fire Alarm Association, Rutherford. Capital, $100,000. Geo. F. Swain, Passaic, and others, incorporators.

**Portland, Me.**—The Orient Electric, Gas and Water Company at Portland. Capital stock, $1,000,000; par value of shares, $50. Joseph B. Reed, of Portland, is president; Hiram Blaisdell, treasurer.

**Portland, Me.**—The Home Gas Machine Company organized at Portland. Capital stock, $500,000; amount paid in, $150; par value of shares, $10. Ellery R. Merriam, of Boston, is president; Edwin S. Thayer, treasurer.

### The Ball Electric Light in Demand.

Among their late sales the Ball Electric Light Co., of New York, report the following:

Standard Light & Power Co., Montpelier, Vt., 25 arc lights.

Wamasutta Mills, New Bedford, Mass., 70 arc lights.

St. Louis Electric Power Co., St. Louis, Mo., 50 arc lights.

Jaime F. Carillo, Maracaibo, Venezuela, S. A., 95 arc lights.

American Electric Light Co., Kansas City, Mo., 75 arc lights.

C. D. Wright, Petersburg, Ill., 50 arc lights.

Adam Glass, Mobile, Ala., 25 arc lights.

Wilmington City Electric Co., Wilmington, Del., 25 arc lights (increase).

Walworth Steam & Power Co., Boston, Mass., 70 arc lights.

California Street Cable Railway Co., San Francisco, Cal., 100 incandescents.

St. Clair Mineral Springs Co., St. Clair, Mich., 500 incandescents.

Chrome Steel Co., Brooklyn, N. Y., 10 incandescents.

—— The Waterhouse arc light plant at the Centennial Exposition is honored by a gold medal and two silver medals. This is the second gold medal awarded to the Waterhouse Company, the first being given by the Board of Government of the Charitable Mechanics Association, Boston, Mass., in December last. It is stated that the judges speak in the highest terms of the Waterhouse apparatus.

ELECTRICAL REVIEW

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NEW YORK, NOV. 3, 1888.

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Even as long as the testimonial writing idiot is abroad, the galvanic belt will find a ready sale among those unfamilar with galvanism.

One of the problems of the day is how to operate electrical service underground. Another, how to operate it alongside leaky steam mains.

King Milan, of Servia, gave his mother-in-law a telephone on his marriage day. Now he's a divorced man and all on her account. He ought to have given her a phonograph. Then she might have written down what she had to say and he could have filed it away for the information of posterity.

In the recent naval manœuvres of the British fleet it was arranged that the enemy should be blockaded, but the enemy having unadvisedly been furnished with electrical search lights of from 8,000 to 30,000 c. p., eluded torpedoes and torpedo-boats and "skipped by the light of the arc lamp."

It is a habit of old-fashioned townships to put off buying reliable fire engines till after the town is burned down. Following the same course, the Whitechapel murders in London have brought a demand for electric street lighting. Perhaps were the arc lamp used there had not been any Whitechapel murders.

If you would ride through a charming region and see the autumnal foliage at its best, go out to Jamaica, Long Island, and take a trip in one of the electric cars; smooth, silent, comfortable they are, with no "g'lang there! whoa there, blankety, blank yer!!" business on the front platform to break abruptly into the inspiration that comes from calm consideration of the subtle mysteries of nature.

"'F yer dont believe it, I c'n show yer the dog!" exclaimed Artemus Ward, when a stranger doubted that his dog swam across the sea after the ship he was on. So with our countrymen showing alleged electrically refined sugar to the English. As it does not look unlike any other sugar, the English very reasonably ask them to show the process—if there is any process—or some proof of its economy. We fear it is not sugar they rely on to raise the "sugar" with; but only that saccharine but innutritious article known as "taffy."

The saving which will result in substituting electricity for horse flesh on the street railways of this country, is hinted at by the fact that the operation of one street railway in England by electricity will result in saving $60,000 per annum over and above the present cost of operating it by horses.

A distinguished professor by the name of M'Kendrick announced, before one of the most learned societies in Europe a few days ago, that there are more than fifty kinds of electrical fishes. We had always known about the *Raia Torpedo* and the *Gymnotus Electricus*—so called because of the cuss words used by the man who first took hold of one and received a shock therefrom—but we were not prepared to encounter forty-eight other species. Our fish editor has threatened to resign and we decline to pursue the subject further.

In France experiments have been made with a "military microphone." This is buried in the ground near a fort or other place to be guarded, and will give a signal at any distance on the approach of any moving body. During the manœuvres of the 17th corps, one could distinguish the passage over the instrument of the band, of the officers, of the commanders of each regiment. The attempt was made to count the number of men passing over it, and the error was only 340 in 5,000. The report of further experiments will be looked for with interest.

There is such a thing as gross negligence of the public safety, which can only call forth unqualified disapprobation. In Harlem one may any night see a number of arc lamps burning under conditions which are certainly unsafe. The lamps are so low that an umbrella carried by a tall man would undoubtedly touch them, or they could be touched with an umbrella by a boy, without making much exertion. In a number of instances the bottom caps are off and the ends of the carbon pencils can be seen protruding an inch or so below the bottoms of the lamps, entirely unprotected. We trust this unsafe condition of things—which can be remedied without much trouble and expense—will be speedily attended to.

St. George's, Hanover Square, London, where all the swell English marriages take place, is to be lighted up with electricity, when the recent demand for permission from the Board of Trade, the Commissioners of Works, the Corporation of London, and a few other branches of the circumlocution office shall be granted. It is said that with good luck, it will not take the London Electric Supply Corporation (Limited), more than eight months to get the necessary permission; of course, anything like unusual weather, or if the chairman of any of the committees should be taken down with gout, might make a difference of several months. Meantime the string of bridal parties winds into the square, preferring to be married under the gaslight or even in the dark rather than wait for electricity.

Cornell University is putting in practice a good idea in having a system of non-resident lecturers. A college faculty, however able, will in time fall into certain ruts of thought and speech and the infusion of new ideas from outsiders cannot fail to be of great benefit. Among the non-resident lecturers announced for this year are Edward Atkinson, the political economist; Hon. E. B. Coxe, ex-president of the Mining Engineers; J. C. Bayles, president of the New York Board of Health; Emery, the marine expert; Babcock, the inventor of the Babcock boiler; Prof. Anthony, the electrician; Mr. F. J. Sprague, inventor of the Sprague motor; Dr. Dudley, chemist of the Pennsylvania Railroad, and Dr. R. W. Raymond, secretary of the Mining Engineers. Besides these Electricians Edison, Thomson and Houston, Mayor Hewitt, President Francis A. Walker, of the Massachusetts Institute of Technology, Edward Burgess, the yacht builder, Admiral Porter, and Presidents Mendenhall and Horace See, are expected.

### *THE ELECTRIC ROAD ON FULTON STREET, NEW YORK.*

At last all obstacles are cleared for the construction of the electric tramway through Fulton street, and New York is now to have a full fledged sample of what the young electric giant can do. The Bentley-Knight conduit system has been adopted, and we confess to respectful admiration of the courage and boldness with which they enter the lists.

Electric railways are, as we all know, an accomplished fact; but those already built and in operation, numerous though they are, have had mainly engineering difficulties to surmount, and these have one by one been overcome. But in the Fulton street road another condition is presented. The vast crowds of pedestrians daily crossing Fulton street, the enormous bulk of truck traffic of the heaviest description, and the numerous lines of street cars met with, to say nothing of the net work of water, gas and steam pipes and electric subways and conduits, are enough to appal the boldest contractor, and altogether present a set of conditions not to be met with in any other city in the world. It is therefore meet that the contractors for this work fully realize the importance of their undertaking and see that every contingency is thoroughly provided for. The smallest failure may work almost irreparable harm to the future of electric street railways. On the other hand their opportunity is great; make an engineering and commercial success of this road, and the carping critics, who ought to have lived a century ago and left us only a memory and a gravestone, will find their occupation gone and their tongues forever stilled.

### *THE NATIONAL ELECTRIC LIGHT ASSOCIATION.*

The functions of this organization are unique in that they do not appear to share the field so well covered by any of the other electric or engineering societies. Its work is devoted to the art of electricity in its commercial applications for illuminating purposes, while questions pertaining to theories and to principles receive appropriate consideration in other electric organizations. The field of the National Electric Light Association is peculiarly a practical one.

On more than one occasion have we considered the status of this organization, its opportunities and its purposes. The diversity of the elements of its organization, and the phenomenal increase of the electric light, rendered it a matter of great difficulty to settle upon what the leading members have always considered to be the proper policy of the organization, as soon as the time became ripe for its inauguration.

The ELECTRICAL REVIEW editorially considered this question in the issue of March 11, among other things, pleading for the different arrangement of the secretaryship, holding that the necessities of the organization required that the office should be of a reasonably permanent nature. The recent action in the appointment of such an officer, and providing the organization with permanent quarters at No. 16 East Twenty-third street, has been directly in the line advocated by the ELECTRICAL REVIEW.

Hitherto the proceedings have been printed by private enterprise and edited as a matter of charity, a method which cannot be relied upon as a matter of permanency, and certainly involves a position not to be desired by either the Association or the very philanthropic gentlemen who have given so much time to the transactions.

This new step has made the organization more concrete, the headquarters serving as a medium of communication and a source of reference. We have referred on various occasions to the peculiar fitness of the new secretary for his position for which he has been exceedingly well qualified, not merely by the advantage of liberal education and general culture, but from wide experience in literary work, and especially in regard to the consideration of statistics and economical questions.

One of the most valuable prospective features of the society is the organization of facts pertaining to electric illumination, and here, as in other forms of statistical information, there is a right and a wrong use of statistics, and they can be presented to their full value and their complete measure of usefulness only by one who is peculiarly qualified for performing such compilations.

### *OUR CHICAGO LETTER.*

(Special Correspondence.)

The C. & C. Motor Company must look to its laurels. Smith—he of the Non-magnetic Watch Company—to judge from the published statement of an electrical reporter, is getting away with Lufkin, or is in cahoots with him. The paragraph is part of a description of the Cincinnati Exposition:

"Non-magnetic watches were found running a C. & C. motor, with, of course, the constancy of movement for which they are justly celebrated."

I stated in these columns some time since that there was a strong suspicion of a "boodle" flavor to some of the skirmishing relative to the telephone ordinance recently passed by the City Council. By way of a "sifter and purifyer" of the facts in the case, Alderman Wetherell on the 22d introduced the following, which was passed:

"*Whereas*, It is currently reported that some person has obtained money or promises of money in the event of the passage by this Council of an ordinance reducing the annual rental of telephones to $75 per annum; and

"*Whereas*, The raising of such funds can only be for the procurement of legislation by corrupt methods or is a false pretense of those procuring such money or promise; be it, therefore,

"*Resolved*, That the Law Department is hereby instructed to investigate this matter, and if any person or persons are found to have violated the law either as giver or receiver of such money or promises they shall be prosecuted to the full extent of the law."

Alderman Ernst said that there were a number of "shyster" attorneys and one or two cent per cent. sharks trying to make money in the way referred to in the above resolution.

This telephone legislation, it may be remarked, in passing, is unlike that which has been the cause of so much trouble elsewhere—inasmuch as there is no penal clause to this, and the company may accept or reject, at will—and it proably will—reject it. Then—but that is afterwards.

Here is a fable which is only a fable in name. There was once a giant monopoly with a huge fist, and the fist was full of copper, and the fist was so large that it held nearly all there was, and the giant laughed "ha! ha! I will sell at better prices, and you shall not buy save at a brisk advance." "The giant will give way—wait," said the consumers, they who eat the copper.

And behold when the day of stock taking was at hand the middle men, the gentlemanly and pleasant men who sell to these consumers this copper wire, there was fear and trembling for the belief was among the smiling middlemen that there would be immense stocks left standing to the debit of merchandise. But when these had gone through and tallied it up, there was less of the fear and the vibrations and the twiddling of their heart strings and these were found humming in the opposite direction, for lo! the quantity was even smaller than was healthy.

Now the consumers have looked in the glass and discovered that their features are becoming lengthened, even to a condition of "length without breadth or thickness," because that there is now no more a plethora of wires upon the market, and the giant still holds his grip on the coppery mass which he holdeth in his hand, and demandeth no less than when the consumer said the first poo-poo at him.

The moral of which is that he laugheth best who laugheth last.

There are wire men on the road, but they are not so numerous as of old, and there are customers who pray and implore and plead, but they cannot get their orders filled. There are manufacturers who strive and sweat and fume, but they cannot keep up with orders; and there are contracts waiting to be signed, depending upon the ability to fill these provoking and hindering wire orders. Why?

The demand has exceeded the supply. The electric light demand is but one of many factors in the question. Motor circuits for power in all sorts of by-ways and hiding places are utilizing an energy which is comparatively new for the purpose. Street railway companies are beginning to be heard in

the market clamoring for power, and this means wire, wire, wire, of all sizes and varieties.

There is almost no end of kinds demanded. Even the much talked about, and certainly deservedly accused underwriter's wire, holds its own, one firm alone being to-day some 100,000 pounds of No. 6 B. & S. behind. There is consolation, however, in the fact that rubber covered and other better wires are gaining on the white wire, and we all hope will sometime drive it out.

Manufacturers are not profiting by any advance in copper, but they state that it is not at all unlikely a farther advance is an approximate possibility.

The electric business is not alone dangerous from the standpoint of current. Edward Hart, a lineman, was working on Friday at some lamps, and left a hammer on the step-ladder with which he was working. He moved the ladder, the hammer fell and struck him squarely on the forehead. The blow rendered him temporarily insane, and extremely violent. An examination showed that he was suffering from congestion of the brain, and was in a dangerous condition. He was taken home, and the physicians in charge were really alarmed at the symptoms.

It has been repeatedly shown that the most dangerous locality for electric lighting is in the shops and around the manufactories of the companies themselves, and that by far the greater portion of deaths and injuries arise from carelessness on the part of the victims themselves, who are mostly employés of these companies. One of the worst and most exposed points in these establishments is the testing room, where too often the the wires more resemble a lot of disgruntled cobwebs than proper wire work.

These circuits in Chicago are now being better arranged. In future these will be run with permanent fixed wires, and an independent switch for each lamp hanger, which will allow of any switched-out lamp being handled with perfect impunity. The wires too, will be so arranged by cross connecting that an accidental touching of two lamps at the same time will not shunt more than the potential of two lamps; and where the testing room is near ground, as in basements, a platform will be placed two or three inches from the floor, on which the employé will stand while at work. It is believed that these precautions will reduce the testing circuit danger to a reasonable minimum.

The town of Lake, a 60,000 suburb of Chicago, is beginning to put on metropolitan airs. The Town of Lake District Telegraph & Electric Company, at Englewood, was incorporated the other day by Geo. R. Waton, F. M. Winters and Chas. G. Armstrong; capital stock, $10,000. C. C. H.

Chicago, Oct. 27, '88.

### Manufacturing Notes.

The American Wire Company, of Cleveland, Ohio, have recently purchased from the Brush Electric Company, of the same city, a plant having capacity of forty-five 1,200 c. p. arc lights and seventy-five 16 c. p. Swan incandescent lamps.

The Goulds Manufacturing Company, of Seneca Falls, N. Y., with headquarters at 60 Barclay street, New York, has issued an illustrated catalogue and price list of pumps engines and hydraulic machinery, adapted for water, steam, wind and electric power. The catalogue comprises nearly 300 pages and is profusely illustrated.

The American Waltham Watch Co., have just gotten out a very neat device for the display of their non-magnetic movement. Two clock movements encased in a compact mahogany box revolve at certain intervals a short double arm at one end of which is placed the non-magnetic movement and at the other the ordinary watch movement. By means of this mechanism each watch is kept for a moment above a large horseshoe magnet, and as the movements are open, its effect on the watches is easily seen. Altogether it forms a striking and attractive exhibit.

In these days of artistic printing it is difficult for any company to particularly excel, yet we think all our readers who see the dainty catalogue just issued by the United States Electric Lighting Company will pronounce it a work in which the art of printing has been reduced to a beautiful science. It is printed in three colors, the lettering on the covering delicately bronzed, and bears the imprint of The James Kempster Printing Company, New York. Mr. Henry Hine, of the U. S. Company, has this work in charge, and is to be congratulated on the attractiveness of his most recent publication.

### *OUR BOSTON LETTER.*

(Special Correspondence.)

The aldermen have passed the order vetoed by the mayor last Spring, giving permission to Henry E. Cobb and others to lay conduits for underground electric wires. Among the provisions of the order which are of interest are the following:

"The space occupied by the conduit when constructed shall not exceed four square feet in cross-section measurement; the said conduits shall not interfere with or obstruct any conduits or pipes already laid in any of said streets, avenues, or squares, or hereafter laid, under permits already granted, without the further order of the Board of Aldermen.

"The parties receiving this franchise shall furnish the city free of all rent or charge, suitable accommodations in said conduits for all wires now owned or controlled by the city, or that may hereafter during the term of this franchise be owned or controlled by the city, and shall furnish and keep in repair such wires without expense to the city.

"The parties receiving this franchise shall pay to the city all the excess of their profits over 10 per cent. of their capital actually invested, and shall also allow their books and accounts to be inspected at any time by the city auditor or any person whom the Board of Aldermen may designate.

"The parties receiving this franchise shall commence work contemplated herein within four months from the passage of this order, unless restrained by the process of law, and shall continue the said work with reasonable diligence until suitable conduits have been built in such of the above-named streets as said parties may elect or the Board of Aldermen may require, and also in such other streets of the city as may be required by the Board of Aldermen, except as hereinbefore provided.

"*Ordered*, That the plans and systems known as the 'drawing induct system,' with manholes at convenient intervals, and 'carbonized stone conduits,' are hereby approved as the plans, system and material to be used as conduits for carrying electric wires under the streets, until otherwise ordered."

Mr. A. Jobs, of Bernburg, Germany, engineer of the well-known Solvay Process Co., which has numerous works in Europe, has been on a tour of inspection in America, and spent several days in this city last week. The company have one manufactory in this country, located near Syracuse, N. Y., where the manufacture of caustic soda, soda ash, etc, is carried on by the Solvay process. While in this city Mr. Jobs visited the offices of the Thomson Electric Welding Co., and was also much interested in the Institute of Technology in this city, pronouncing it ahead of similar institutions in Europe.

The Society of Arts held a regular meeting in the Rogers Building of the Institute of Technology, Thursday evening. Mr. Charles A. White exhibited and described the Eco Magneto Watchman's Clock, an account of which has already appeared in these columns. This was followed by a very interesting paper by Mr. W. E. Gump on "The Writing Telegraph." The speaker first alluded to the pioneer invention in this line, that of Mr. E. A. Cowper, of England, which required two separate telegraphic circuits, one to convey the up and down motion, the other for the right and left movement, a proper combination of which would result in the formation of any of the characters of writing. The up and down and right and left components were simultaneously transmitted. Each continuously varying component was transmitted by causing the resistance of the circuit to vary with the component in question. At the receiving station these two components were recomposed by a pantograph arrangement of taut coils and the resultant motion was thus communicated to the duplicate pen. With this apparatus the writing over a circuit of 40 miles was very distinct and a fair reproduction. The second inventor in this line was Mr. J. H. Robertson, whose apparatus was next described and his improvements discussed. The tremor in the receiving instrument was finally overcome by immersing the armature or its extension in a liquid. The present transmitters and receivers were next described, the description being illustrated by an exhibition of the actual apparatus. The speaker stated in closing that the instruments were now on a thoroughly practical and commercial basis, as they have been in use for over a year, and any defects noted in commercial use have been remedied. In regard to the effect of induction on the wires, he said no effect whatever has yet been noticed. The wires have been tried with the electric wires in the subways of London and are strung with electric light wires in Pittsburgh, but the induction was not apparent in the movement of the pen.

The Wednesday "talk" of the Electric Club was fairly well attended. The discussion which followed was participated in by Mr. E. W. Rice, Mr. C. J. H. Woodbury, Mr. Griggs, Mr. Wilson and others, and brought out many interesting points.

Mr. F. J. Sprague has been a Boston visitor recently.

The familiar face of Dr. Moses was visible in this city the first of last week.

Mr. George F. Calkin, agent of the Brush Electric Company at St. John, N. B., has made an arrangement for the installation of several Baxter motors for his territory.

Other Boston visitors last week were Mr. George Westinghouse, Jr., H. M. Byllesby, Gen. C. H. Barney and Mr. George Hoskin.

A social event in Dorchester last week was the marriage of Mrs. A. P. Snethen, sister-in-law of Mr. Frank Ridlon, and Erastus W. Marston, of Oakland, Cal. The ceremony took place on Wednesday evening at Mr. Ridlon's residence. The piazzas and grounds were very brilliantly illuminated by eighteen 20 c. p. lamps of the Sun pattern arranged in clusters. To the uninitiated these lights were a wonder, no current being in the vicinity. The Accumulator Company's storage system was used, the plant being managed by Mr. H. C. Wirt.

In view of the probable remodelling of the Hancock building in the near future, and consequent removal of the many electric interests there centered, it has been suggested that some centrally located building might be secured in which these and other electrical agencies and headquarters could be brought together, a step which would certainly be advantageous to all.

Boston, Oct. 29, 1888. T. W. S.

### Personal.

Mr. A. J. De Camp, of Philadelphia, was a New York visitor last week, accompanied by Mrs. De Camp.

Prof. W. W. Jaques, of the American Bell Telephone Company, Boston, registered at the Electric Club last week.

Mr. D. R. Russell, of the Parker-Russell Company, St. Louis, is in the East looking after the large carbon trade of his company.

Prof. C. H. Haskins, the telephone pioneer and accomplished gentleman, has just returned from Europe with health much improved.

Mr. L. H. Johnson, formerly with the Baldwin Gas Engine Company, has accepted a position with the Julien Electric Company, 120 Broadway.

Mr. John W. Beane, of the Tucker Electrical Company, has been confined to his bed for nearly two months past, but is now convalescent and is able to be out a few hours each day.

Mr. W. D. Sargent, of Brooklyn, has been ill for two weeks past and unable to leave his house. No man in the telephone business has more or warmer friends than Mr. Sargent, all of whom will wish for his early recovery.

Capt. Geo. N. Stone, the well-known telephone manager of Cincinnati, was married in New York, Oct. 20th, to Mrs. M. M. Harrington, of Everett, Mass. A host of telephonic friends will congratulate the genial Captain.

John Wanamaker, of Philadelphia, has just contracted for a 500 light Brush Swan plant for the lighting of his country residence. The order was taken by Edward W. Tisdall, the Philadelphia representative of the Brush Electric Company.

The Board of Trustees of the Edison Electric Light Company have re-elected Mr. E. H. Johnson, president; Mr. F. S. Hastings, treasurer, and J. H. McClement, comptroller.

The Faraday Carbon Works of Pittsburgh, Pa., were slightly damaged by fire on Monday last, but are filling orders as usual.

### *OUR RICHMOND LETTER.*

(Special Correspondence.)

The Virginia Exposition started at Richmond on the third of this month. After the formal opening speeches, Mrs. Gov. Lee plucked a rose from the center of a large bouquet on the middle of the stage in the Music Hall, thereby closing an electrical circuit and starting the machinery all over the main building.

The building and grounds are lighted by 300 arc lights of the Schuyler system and 700 incandescent lights of the Westinghouse alternating system.

The Art Department, in which there is a fine collection of paintings, is lighted by 200, and Horticultural Hall by 100, incandescent lamps.

Buffalo Bill gives a show daily on the ground, and has 50 arc lights distributed so that the Indians and cow boys can ride their "Bucking Broncos" as well in the evening as by daylight.

The whole plant is run from within the building, and has been constructed within 10 days by Mr. W. H. Cole and was a complete success from the start. The dynamos are run direct from three Armington & Sims engines, with the Underwood cotton leather belts.

Mr. Cole, who is also the superintendent of the Virginia Electric Company, and has the electrical and mechanical charge of the Richmond Union Passenger Railroad Company, in order to be certain of his lights, ran a separate circuit from the city station to the Exposition buildings, on which he ran 20 arc lights scattered over the grounds and buildings independent of the local plant. He also ran a separate power circuit from the city station for motors, and a number are in daily operation at that place running different kinds of machinery.

The Electrical Department of the Exposition is a feature, and probably attracts more attention than any other. This is in charge of Messrs. H. W. Thompson and W. H. Cole. The E. S. Greeley & Co., of New York City, have a magnificent display of high class test instruments and other electrical goods. Partrick & Carter, of Philadelphia, are also exhibitors of a variety of eletrical goods. The C. & C. Motor Company and the Sprague Motor Company are also represented.

The Gamewell Fire Alarm Telegraph Co. have a complete set of their boxes and apparatus in practical operation on the grounds and in the building.

The Southern Bell Telephone Co. have a number of their "Phones" scattered around with a "put-a-nickle-in-the-slot" attachment for connecting, that seems to be popular. Messrs. Augustine & Co., a new firm in Richmond, who handle electrical supplies in connection with railway supplies, have a good display of electrical apparatus.

The Simplex Electrical Co. have a beautiful pyramid of reels of their wire on exhibition which attracts a great deal of attention.

The electric railroad is now running perfectly, and the same may be said of the electric lights.

Mr. Cole has started another 2,500 light Westinghouse dynamo with a new compound Westinghouse engine of 250 horse power, and has a capacity now for 6,000 lights, all contracted for. He has 40 motors in operation on a special circuit, principally Sprague, although running some Daft and Hawkeye motors satisfactorily.

There is talk of establishing a district messenger service in Richmond. It is needed.

The Norfolk street railroad are talking about applying electricity to their road.

Mr. Cole has successfully applied a Sprague one-half horse power motor to pumping the bellows of the large organ at St. Peter's Cathedral in Richmond. It works perfectly and is arranged to automatically control the air in the bellows. The organist has a small switch at his right hand and simply turns on the current at the beginning and turns it off when leaving; the rest of the time it takes care of itself.

Lexington, Va., is agitating the establishment of an electric light plant.

Richmond, Va., Oct. 24. C. W.

## Telephonic News

*** The telephone system at Farmington, N. H., has been discontinued, and the wires will be removed. It has never been a paying investment there, the receipts for September being less than $5.

*** Findlay, Ohio, has had a little local telephone row for the past year and a half, between the Cushman and the Bell companies. On the 17th the former company threw up its hands, and sold out to the Bell Company the entire exchange and belongings. The Bell company will operate the exchange in future, and the old instruments will of course, be retired.

*** Mr. Morris F. Tyler, president of the Southern New England Telephone Company, has been in Hartford the past week endeavoring to remedy the trouble on the telephone lines in that city caused, it is claimed, by the electric light wires. The citizens complain of the noise on their lines, and Mr. Tyler came to the city to confer with the electric light people.

*** At a meeting of the directors of the New England Telephone and Telegraph Company held October 24, a dividend of 75 cents per share was declared, payable on Thursday, November 15th, 1888, to stockholders of record at the close of business on Wednesday, October 31, 1888. The transfer book will be closed from November 1 to November 14, 1888, both days included.

*** Fifty citizens of Malden, Mass., have signed a paper protesting against the alleged inefficiency of the evening service of the Suburban Telephone Company, due to the placing of the wires of the electric light company on the telephone company's poles. The subscribers state that they will refuse to pay any more dues until the evil is remedied, and the company may remove the telephones if it pleases.

*** The following is a statement of business of the New England Telephone and Telegraph Company for quarter ending September 30, 1888 :

| | |
|---|---|
| Gross Receipts for 3 months ending Sept. 30, 1888 | $288,862.60 |
| Expenses for 3 months ending Sept. 30, 1888 | 210,069.89 |
| Net Earnings for 3 months ending Sept. 30, 1888 | 78,792.71 |
| Construction for 3 months ending Sept. 30, 1888 | 34,369.37 |

*** Mr. McCleur's experiences of the troubles caused in telephone circuits by the currents used to operate arc circuits and electrically-propelled tramcars are very readable, and although the time has not yet arrived when we in England are likely to be thus troubled, it will be well to remember this paper in the event of similar work being carried out here. The numberless worries and trials to which American electricians, through the very multiplicity of their operations, are subjected, and which they generally manage to finally overcome or reduce to a minimum, cannot fail to prove of service to our own countrymen.—*London Electrical Review.*

*** The Bell Telephone Company's instrument statement for the month ended Oct. 20 makes a favorable exhibit. The net output increased 519, and for 10 months the increase has been 4,541 instruments. The comparative figures are :

| Month, Oct. 20. | 1888. | 1887. | Inc. |
|---|---|---|---|
| Gross output | 4,140 | 3,689 | 451 |
| Returned | 2,145 | 2,213 | *68 |
| Net output | 1,995 | 1,476 | 519 |
| Since Dec. 20, | 1887-8. | 1886-7. | |
| Gross output | 45,800 | 44,340 | 1,460 |
| Returned | 18,947 | 22,028 | *3,081 |
| Net output | 26,853 | 22,312 | 4,541 |

* Decrease.

### *OUR KANSAS CITY LETTER.*

(Special Correspondence.)

Wichita and Kansas City, Kas., both have electric railways under construction, the one at Wichita being about completed. An extension of time has been allowed the Kansas City, Kas., road, and no attempt will be made to get it in operation before next spring.

Work is being rapidly pushed on the plant of the Kansas City, Kas., electric light company. The work of putting up the poles and wiring is progressing, and the building is under way. Fell & Dallgreen are the builders, their bid for the heavy construction being $5,990.

At Baxter Springs, Kansas, an electric light and power company has been organized by W. L. Trowbridge, N. R. Crowell and B. S. Warner of that city, and Alex. Warner of Pomfret, Conn., and E. L. Warner of Woodstock, Conn.

A Leavenworth company has been granted a franchise and right of way for a district police, fire and messenger service which is to be put in operation as soon as a plant can be established. J. D. Hobbs is the superintendent.

A charter has been granted to the Holton, Kas., electric light company, which has a capital stock of $20,000, and whose affairs will be directed by J. S. Hopkins, L. A. Walker, Sebastian Globe, M. B. Smythe and J. Q. Myers. This company will operate with the accumulator system, for which they have contracted with the Interstate Electric Company of Kansas City, Mo.

George H. Blackwilder, H. C. Sluss, Charles D. Duston, C. E. Jackson and J. O. Davidson, of Wichita, have chipped in their ducats to the extent of $10,000, and have organized the Citizens' Electric Light Company.

Mr. Charles Grover, who has been representing the Hawkeye Electric Light Company of Oskaloosa, Ia., in this city, has gone over the river and become the manager of the Kansas City, Kas., electric light company. As yet the Hawkeye Company has not established any successor here.

The gas company of Des Moines, Ia., now operating 300 arc lights, is putting in a 1,000 light alternating current plant. It is expected that the Thomson-Houston electric road here will be in operation by Nov. 1.

Active preparations are now being made for putting in the long talked of 10,000-light Westinghouse plant at St. Joseph, Mo. A 300-light plant of the Mather system is now being put in the court house by the Western Engineering Company, of Lincoln, Neb.

O. C. Steele, representing the Brush Company, has installed an arc light plant at Norton, Kas.

The Southwestern Electric Supply Company has established an electrical repair shop here to fill a sort of "long felt want," and reports the shop as doing a good business already.

The Kansas City Electric Light Company has fitted up a room for its meters. Hereafter the company will know exactly how much electricity its patrons use.

The building for the Edison plant is beginning to appear above ground. The brick work began to-day on top of the massive stone foundations, and the iron supports and beams are being put in position.

Mr. Weeks is both a manager of an electric light plant and the practical operator of one. The one he operates is his very own and illuminates his home. It consists of one of Prof. Thomson's latest patent dynamo of 25 16-candle power lights capacity, a two-horse power Baxter motor and a Baxter regulator. The motor is operated by the electricity from an arc light circuit ten miles long. Mr. Weeks believes this is the first attempt to drive a constant potential dynamo for incandescent lighting by means of a constant current motor. He says it is a perfect success. He has his home wired for 30 lights.

The Interstate Company has its new plant in operation and is now preparing to establish a number of sub-stations of accumulators. These accumulators will be charged by means of a high tension dynamo just received from the Detroit Electrical Works which made it expressly for the Interstate's use for this purpose. The Interstate Company proposes to introduce a novelty in Kansas City, and that is an electric wagon. One is now being constructed for the company in the East and will soon be ready for shipment. Accumulators will of course furnish the electricity. Superintendent Bossart reports a number of contracts to light business houses, also one for 200 for the general offices of the Memphis Route in this city, and for the buildings of the Rock Island in Smith Center, Kas. The company lights the building it occupies, the Keith & Perry building. The Western Electrical Construction Company did the wiring, and Wilmarth & Co., of Chicago, supplied the fixtures ; H. J. Brunner & Co., of this city, put in the electric bells.

The Western Electric Lock Company has been organized here with a capital stock of $100,000, by B. F. Jones, E. L. Martin and O. W. Jones.

E. J. Lawless, formerly superintendent of the Metropolitan Street Railway Company, is now in the East investigating the operation of electric railways. If he returns a verdict of success an electric railway will be established in this city.

Chief Hale of the fire department has a dozen of his fire alarm telephones now in operation and they are voted a complete success. A small box containing the mechanism is placed alongside the telephone instrument. Pull down a lever and you are automatically connected with the fire department headquarters. No waiting for central nor any body. KAWSMOUTH.

Kansas City, Mo., Oct. 20.

### A Victory for the Western Union.

In the case of the Western Union Telegraph Company vs. The Commonwealth of Pennsylvania, the United States Supreme Court reversed the decision of the lower court.

The Commonwealth levied a tax on telegrams from points in the State to points without the State, and, in fact, on all business passing over the company's lines in the State.

The court, through the new Chief Justice Fuller, holds that the Commonwealth was not entitled to collect except for messages wholly within the State.

*** Our Kansas City correspondent states that Chief Hale has so arranged his telephone fire alarm system that he can, by means of a switch, instantly connect with headquarters from any of his stations without calling up the central. The Kansas City chief has always been a loyal believer in the telephone and its pre-eminent value as a quick and accurate means of giving fire alarms.

*** The New England Telephone and Telegraph Company, of Boston, has leased the commodious building Nos. 20 and 22 India Square, Boston, for the accommodation of its supply department, and will occupy the new quarters on November 1st next. The "overflow" from the main building, No. 50 Pearl street, has become necessary on account of the rapidly increasing business of this company, the present quarters being inadequate. The office of the purchasing agent, Mr. N. W. Lillie, will also be removed to the above location.

*** The president of the levee commissioners at Delta, La., has been authorized to advertise for proposals for the construction of a telephone line along the levee front of the entire district, a distance of about 200 miles. The north end of the line will be at Sterling, Ark., where connection may be had by telephone with Arkansas City. It will run south to Roseland, in Concordia parish. It is proposed to put the line up in first-class style, using nothing but the best material. Twenty telephone sets will be stationed at intervals along the line, and the value of it can't be overestimated in times of danger and in the building of levees, and $500 was appropriated to pay the expenses of the State board of engineers.

### Glances at Electrical Applications to Mining.

BY TIMOTHY W. SPRAGUE, S.B., BEFORE THE BOSTON ELECTRIC CLUB.

(Member American Institute Mining Engineers.)

Reports frequently appear in the Eastern dailies setting forth the wonderful advantages of investments placed in certain newly discovered mining properties, in some remote district of the great West. Some money is perhaps sent out, and never heard of in the way of dividends afterward. The investor and his friends form an opinion of the mining industry and mining men, stamping the entire craft as impostors and swindlers. In the undue prominence which is often given to such affairs, the real solid paying industry is lost sight of. It exists, nevertheless, and is one of the most important branches of business in the United States.

Illustrating this, I have here the United States Geological Survey Tables of mineral production during the past few years. In addition to the extent of this production these tables also show its wonderful increase.

Money judiciously invested in mining is as safe and sure of return as though placed in registered government bonds. Those engaged in mining are, and have been for years, men who combine with good judgment a certain conservatism, which, however, must not prevent their quick appreciation of a real improvement, and great energy and push. I refer, of course, to the successful men, and my previous statement covers that; for if they are not successful they very soon are not engaged in mining. They are a set of men believing in a proper combination of theory and practice, as evidenced in the early establishment of the American Institute of Mining Engineers in 1871, and the large number of almost invaluable papers read before its members on nearly every subject, practical and theoretical, at its fifty-two meetings, since held in various parts of the country, from Halifax, N. S., to Birmingham, Ala., and from Boston, Mass., to Denver, Col., and Butte City, Mon.

I mention these facts to show (to any such unfortunate investors) that the mining business is not an uncertain, speculative industry; and that the men engaged in its direction are well educated, practical men ; always on the lookout for real improvements, and improving their methods and practices by frequent interchange of ideas.

My glances at electrical applications to mining in the West, must be principally of the prophetic order ; as, with the exception of lighting, and of one or two cases of which I shall speak later, but which unfortunately I have not seen myself, electricity is not at the present time playing an important part in mining work. This is not saying or inferring anything at all discouraging, for it is simply for the reason that the companies engaged in the electrical power business have devoted but a short time to the subject, and even in that short time their best energies seem rather to have leaned towards street railways and stationary motor business in the East.

The mining business has existed for many, many years, and mines existed where shafts and levels have for a long time served for transportation, haulage, pumping and ventilation ; and while in the aggregate the mining business is waiting with open arms —so to speak—for electric power, electric power must on its part conform itself to rest easily in those arms, to carry out the metaphor. This is illustrated by a case of which I heard recently. A mining man sent dimensions, etc., of a level to a representative electric power company, asking for figures on size, cost, etc., of a motor car to draw certain loads in the tunnel. When the reply came back, it was found the motor car would occupy an entire section of the tunnel. The power wanted was not excessive, and a proper amount of attention would doubtless adapt a car to such a use and make its use possible.

To give a hasty and incomplete view of the work done in mining, first is the drilling, or, in soft material, digging, of shafts, tunnels, and levels. Then the removal of this excavated material by cars and hoisting cages. The disposition of the ore and gangue removed depends primarily on the character of the ore and on the presence or absence of milling or smelting plants in the vicinity. At all events it must be brought to the surface and carried away from the top of the shaft or mouth of tunnel. The men must be carried to and from their work, and this alone in large mines is a matter of great importance. Pumping and ventilation require the expenditure of much power, and the handling of lumber for timbering is also a serious question. This becomes clearer when we know that in the Lake Superior copper region, the Calumet & Hecla alone uses up millions of cubic feet of lumber per annum.

On the surface, either at the mine or some other point, the ore must be treated ; that is, the valuable contents separated from the worthless gangue, and put in marketable shape. In the present paper it will be

impossible to take up these steps in detail. Suffice it to say that power, and distributed power, is required throughout the operation.

Now look for a moment at the present conditions and present methods. Steam power is almost universally used. Mines are often, from their very nature, located in mountainous and inaccessible positions, where fuel is scarce and transportation costly. Water power is rarely so situated as to be of much practical use. Isolated steam plants to the number of six or eight, some underground, are often in use on one property; and, even then, wire-rope transmission of power long distances is also used. This at a glance must be seen to be not the most economical arrangement.

Compressed air has a limited use, but gives a low efficiency, and is practically useless for the transmission of power for more than three miles, and at that distance, with an expensive plant, gives but 35 per cent. efficiency. The plant I speak of is located in Michigan. An electrical company figuring on this plant guarantee an efficiency of 70 per cent., and the cost of the entire electrical plant not to exceed $75,000.

This is the power used in hoisting, ventilating, etc. For drilling, compressed air or steam are used in the works of any size—preferably the former. The use of compressed air necessitates powerful and very expensive air compressors and carefully constructed and maintained pipe lines. At the Vermillion iron mine, Tower, Minn., two Ingersoll compressors—steam and air chambers (20" by 30")—run by an engine of 130 h. p. and maintaining an air pressure of 60 pounds to the square inch, are necessary to operate 28 Ingersoll rock drills. At the Anaconda mine, in Butte, Mon., an air pressure of 75 pounds is maintained for 45 drills. A new compressor has been found necessary there, and is to be one of the most expensive pieces of apparatus belonging to the company.

The qualifications of electrical power for these uses are probably better known to you than to me, so I will but speak of them hurriedly. In the first place its being so easily transferred is a prime advantage. In no other known way can remote water power be so easily made use of, nor steam power generated at a point where fuel is obtainable at a moderate cost, be transferred to a distant point of application. But it seems to me, also, that electricity from its convenience, adaptability and varied applications, can step in and compete with other forms of energy, even where the above conditions are not met. A large central steam plant distributing electricity for almost any use, from power in varied forms, to lighting, and as a chemical agent, must surely prove in the long run more economical than several small, independently operated steam plants, with more or less wire rope power transmission and expensive air compressors.

The use of air drills has the advantage that a certain ventilation is thus effected, the exhaust air from the drill being perfectly pure for respiration. The improved general ventilation which would be effected by the free use of ventilating fans, which would surely follow the introduction of electrical power, would, I think, overbalance this advantage. In regard to electric drills, they have not as yet received a thoroughly practical test, at least, in this country, and figures as to their economy are not obtainable, I think. They exist, however, both as percussion and rotary drills, and have been in use in a more or less extensive way.* The percussion drills consist, as stated in the patent specifications, in an apparatus for operating tools by means of an electro-magnetic core working inside of a solenoid or hollow magnet. The inventors claim for them the speed and power of the present air drills, easy regulation, and probably less weight; while the economic advantages of a wire installation over the expensive pipe plant for air are apparent.

The advantages of electric light for mining operations have already been recognized very largely, both in mining proper and its attendant industry, metallurgy. At the Vermillion mine at Tower, Minn., which is 100 miles north of Duluth, and in a country where one is surprised to see any human habitation, the electric light shines forth as the one redeeming feature in a desolate landscape. The workings there are nearly all open, being in reality deep pits. The arc lights are placed in commanding positions, and are arranged so as to be entirely removed in the day time, or when blasting is to be done In general it may be said that electric lighting is being very generally adopted in the West for above-ground work, but has not, I think, been extensively employed below the surface. That it will be, is however, only a matter of time. The objections early made against the employment of electric currents underground for any purpose—that it was impossible to keep wire properly insulated in damp places, and dangerous also—have been disposed of by improvements of the wire manufacturers, and there is no reason why wires should not be strung as confidently in a properly timbered shaft or level as in the halls and rooms of any manufactory. The particular advantages of electric underground lighting, in the way of safety, convenience, increased illumination, and therefore more work done, are too apparent to need mention.

Electricity is entering more and more into the metallurgy of gold and silver in amalgamation processes, and the desirability of having an electric current "on tap," so to speak, for work of this kind may prove an additional argument in many cases for the establishment of a lighting or power plant. One of the prominent milling machines using a current is the Wiswell Ore Pulverizer and Amalgamator, manufactured in this city. This consists essentially of a circular trough lined with amalgamating plates, in which four heavy wheels revolve, grinding the ore to a fine pulp. Mercury is fed to the mill at intervals, to aid in the amalgamation of the gold or silver. An electric current is maintained through the pulp, mercury and plates, the plates and mercury being the negative poles or cathodes and the ore pulp solution the anode. This is accomplished by means of a small dynamo, the Hall Victor No. 2 one-half horse power being used, the positive wire connected with wire brushes trailing through the pulp, one after each wheel, and the negative carried to the bed and side plates. The action is practically that of electroplating.

An instance of electrical power already in use in mining—and meeting the requirements and fulfilling the conditions for such work—is the installation of the enormous plant of the Sprague Motor system at Big Bend, on the Feather River, Butte County, California. A water-fall of 300 feet was obtained, and at this point are placed powerful Pelton wheels, giving a very large horse power. The electric generators put in here furnish current along a circuit of eighteen miles, extending around the entire bend of the river. Motors are placed along the circuit at fourteen different points, and furnish power required for hoisting, pumping, and running machinery. Another mining application by this company has been made at Aspen, Col., where an electric motor is applied to hoisting purposes. The hoisting machine consists of the usual drum mounted on a shaft, carrying a friction wheel. A parallell shaft carries a paper-faced friction pulley, bearing against the iron face of the friction wheel. For reducing the speed, intermediate gears mesh into pinions on each end of the armature shaft. Voltage 440, dynamo a mile off. Two hoists of this kind are to be operated on the circuit, beside a ten horse power motor of standard shape.

In July the plant was not in actual operation; but absolute instantaneous control—which is essential to a hoisting plant—is claimed to have been obtained, and I have since learned through the columns of the *Engineering and Mining Journal*, that the Aspen Company has effected a large saving in cost of haulage, hoisting and pumping, by its electric plant, and has ordered several more machines. Plans are also being perfected for a large central power station, to be run by water power, the energy to be transmitted electrically to other mines in the district. In this connection it may also be mentioned that a large coal and coke company at Glenwood, Col., is putting in an electric plant to utilize the energy of a 470 feet of head water and carry the power three miles away. Instances of economic transference of power by electricity abroad are constantly being reported.

One of the latest is at Lucerne, where a 125 horse power water wheel at the River Aar operates two 25 horse power dynamos, from which insulated copper wires carry the current three miles for railway work, with an estimated loss in transmission of 25 per cent.

The aerial tramways now being put on the market with electric propulsion promise to become important factors in haulage. The cables on which the cars are suspended are the conveyers of the current; being properly protected by covering plates, and small motors are placed on each car. The case of operation and control and other advantages of such a system will doubtless make its early introduction almost a necessity.

It is interesting to note, in speaking of the applications of electricity to mining, the position of the mining men and their opinions on the subject. I had occasion some time ago to make some inquiries in this direction, and found that the almost universal opinion was that electricity and mining were to become more and more closely identified. Among those consulted were Profs. Richards and Clarke of the Institute of Technology, Mr. Eckley B. Coxe of Pennsylvania, Mr. Eustis of the Oxford Copper and Sulphur Co., and Mr. E. C. Spilsbury, of New York; men who are well known in the profession and who do not express opinions lightly. The same opinion prevails in the West both among practical men and the agents of such mining machinery manufacturers as Frazer & Chalmers, who, from their dealings with the mining companies, are excellent judges of their needs and dispositions.

The whole question, which I have so roughly and incompletely touched upon, is taken up in a systematic and comprehensive manner, in a paper read before the Boston meeting of the American Institute of Mining Engineers, in February last, by Mr. George W. Mansfield, of the Thomson-Houston Company.

In this hasty "talk," so-called, I have said nothing of another use of electricity in ore dressing, namely, the electric ore separator for concentration of magnetic iron ore, on which much time has been spent, and good results are claimed; but the time at my disposal has been limited, and with this excuse, I must ask your indulgence for this and other omissions and for the general incompleteness of the paper.

## *SOUTHERN ELECTRICAL NOTES.*

(Special Correspondence.)

The town of High Point, North Carolina, is soon to have electric lights.

The Planters' Oil and Manufacturing Company at West Point, Georgia, intend erecting an electric light plant of from 300 to 400 lights capacity.

Benjamin C. Higdon, night manager of the Western Union Telegraph Company's office in New Orleans, died at 1.45 o'clock on the morning of the 9th inst., after a brief illness.

Seventy-eight cases of yellow fever are reported as cured by Mr. Webb's electro-libration, and the weather unfavorable.

The town of Abingdon, Virginia, has decided by popular vote to issue $20,000 of bonds for water works and electric light plant.

Considerable activity is being manifested now in Texas in electrical improvements. At Victoria, it is reported, that the erection of an electric plant is contemplated. The capital stock of the San Antonio Electric Light Company has been increased from $50,000 to $100,000. The San Antonio Gas Company also have added a 2,000 candle power arc light daynmo to their electric light plant. At Marshall the electric light plant has been sold to the Westinghouse Electric Light Co., of Pittsburg, for $4,800. At Laredo the Electric Light and Power Company are increasing the capacity of fheir plant and adding a repair machine shop. At Gatesville W. F. P. Moltram, of Dallas, agent Edison Electric Light Company, has contract to furnish the State Reformatory with a 150 light plant.

At Statesville, North Carolina, the city has decided by popular vote to issue $8,000 of bonds to purchase electric light plant.

At Morgantown, North Carolina, the Cotton Manufacturing Company who are building a $2,000 spindle mill, will put in an electric light plant to be run by an engine of 10 horse power.

The new prisoners' booths which are a part of the system of the police alarm telegraph, are now being erected at stated places about the city of Charleston. All the alarm stations are up, and will be in working order in a few days. The booths are about seven feet high, octagonal in shape and about three feet in diameter. About six feet from the bottom, the eight sides all meet in an apex; at the top there is a ventilator and several panes of glass, by which both light and air may enter. They are fastened securely, top and bottom, to the telegraph poles. When an officer makes an arrest, he opens a booth, puts the prisoner in, locks the door and rings for an ambulance, stretcher or whatever else he may need.

Judge Roney, in the Superior Court of Georgia, has ordered the sale of the entire plant, at Augusta, Ga., of the American Illuminating Company, whose electrical apparatus was damaged by the recent floods. The company has been in the hands of a receiver for some months. This terminates the war between the two rival electric light companies of Augusta, Ga.

Jimmie O'Driscoll, the young Charleston operator, who left this city some weeks ago to brave the perils of the yellow fever, at Jacksonville, and who was taken ill by the fever, has greatly recovered. The following is a list of the employés in the telegraph office at Jacksonville who have been ill:

Superintendent B. F. Dillon, Operators Sweeney, Birkner, Shearer, Daniel, Ford, Hollenbeck, Armstrong, Turner, DeForrest and O'Driscoll; Clerks Webb, Converse, Smith and Robinson, also four messengers. Of the above, Ford, Hollenbeck, DeForrest and Robinson have died. Manager Crawly lost his wife. Chief Operator Wallace lost his wife and child. There are still seven (7) who have so far escaped the plague, these are Wade, of New Orleans, Robins, of Tampay, three Wallaces, R. H. Fleming, of Charleston, Rivers and Miss O'Connor, of Florida. Some of the latter have had the fever in their households, but so far escaped it, personally. Edward A. Oldham.

Charleston, S. C., Oct. 16, 1888.

## TELEGRAPHIC

.... Mr. W. E. Miller and others have organized an electric railway company in Newark, Ohio. This is an enterprising little city and, of course, wants all the advantages that electricity brings.

.... The electric light wires are now carefully inspected by the insurance inspection bureau, but there is no oversight over other wires, and it is for this purpose especially that an inspector of wires is asked for in the city of Boston.

.... In the council of Providence, R. I., an ordinance was adopted giving to the Rhode Island Electric Protective Company the same rights and privileges possessed by their predecessor, the Holmes Burglar Alarm Telegraph Company.

.... District Superintendent C. O. Rowe, of the Western Union Telegraph Company, is making arrangements to remove his office from Titusville to Pittsburgh. The removal does not involve any change in the district, either as to lines or employés; neither is it necessitated by any change of this character. The reason assigned is that since the district was enlarged, about a year ago, Mr. Rowe has found that Pittsburgh is a more convenient point for the transction of his business than Titusville.

.... The Boston Board of Fire Underwriters, of Boston, have voted to make a general allowance of ten per cent. for the use of any approved automatic fire alarm system in place of the following, which have heretofore been the rates: On rates of 60 cents or under, five per cent.; on rates above 60 cents, and under $1, seven and a half per cent.; on rates of $1, and less than $2.50, ten per cent.; on rates of $2.50 and upwards, the allowance to be discretionary with the committee on tariff.

.... Willis J. Cook, the noted telegraph operator and familiarly known as "Bif," died at the home of his parents in Sandusky, Ohio, Oct. 23d, from blood poisoning resulting from malarial fever contracted at Aspinwall, where he was chief operator in the service of the Panama Railway. Mr. Cook was known far and wide as one of the greatest experts of the craft, and several years ago was in the service of the Associated Press at Washington on the New York and Washington circuit. His remarkable feats of telegraphy there made him famous among operators throughout the country. Mr. Cook was in the 37th year of his age.

### The Night Operator.

At the Western Union and Postal Telegraph offices there are large forces employed at night in both instances. Taking advantage of the half rate, thousands of dollars worth of the business pours over the counters after six o'clock in the evening. The great volume of dispatches handled for the morning newspapers, too, require many intelligent and fast operators. There are about 250 night operators in Chicago, says the *Tribune* of that city. The majority are young men, but some are gray haired veterans whose years of service at the key ought to demand their retirement on a pension roll—something not yet established, by the way. There is a fascination in pounding the key or transcribing its clikings to paper when the world is sleeping that exerts so potent an influence that these veterans cannot break away from it. "I have tried day jobs half a dozen times," said one, "but I couldn't accustom myself to the increased whir and rattle and activity, so I always drifted back to the old way. I have grown up in that way. I was a night messenger boy in New York years ago, and have held down town night sits almost continuously since that time, so that it isn't to be wondered at that I love the darkness, and not because my deeds are evil, either."

* Mr. G. W. Mansfield, of the Thomson-Houston Co., in a paper read before the A. I. M. E., states that electric rotary drills have successfully competed in France with steam and compressed air.

Electricity is to be used as the motive power on the famous incline road at Cincinnati. It will be a good test of the new motive power.

The Daft Electric Light Company has issued a very handsome catalogue relating to electric railways of the Daft system. The publication is illustrated and the text is interestingly written.

The Citizens Light and Power Company of Burlington, Vt., has elected the following named officers: President, Willard Crane; vice-president, Elias Lyman; clerk and treasurer, Robert Roberts, Esq. The company expect to begin business at once.

The overhead wires are nearly ready with which to run the Highland line (Lynn) horse cars by electric power. The electric current will be furnished by the Lynn Gas and Electric Company from their new station on Pleasant street, where the Stewart street plant will be moved to in a few days. It is now confidently expected that the cars will run by electricity by November 1.

Mr. A. P. Crowley, who has for some time represented the Baxter Motor Co., in Troy, N. Y., has just become associated with Mr. H. C. Spaulding, of the Thomson-Houston Co., and will take charge of the increasing motor business of this company in Providence, R. I. As a result of Mr. Spaulding's active efforts the Narragansett Electric Co., of that city, is now operating one of the finest motor circuits in New England, power being at present furnished to about a dozen consumers in amounts varying from 1 to 15 horse power. A 400 volt circuit is in use, and the Narragansett Co. has made ample provision for pushing this branch of its business as soon as the new station is completed.

Construction on the Sprague Electrical Railway at East Reading, Pa., is being carried forward as rapidly as possible. The work of grading has already been finished; the greatest cut being seven feet deep, and the greatest filling 30 feet. The grades on this road run in some places as high as nine feet in 100. The work of erecting poles for the overhead system is progressing rapidly. About one-half the number required are already in position. One-half the rails have been received and the rest are expected daily. Track laying will be commenced next week and prosecuted with a full force of hands, with the expectation of completing the road in about two weeks and ready to be put into operation.

The power station at Allston for the Brookline branch of the West End Railway of Boston has now almost been completed. Work on the overhead system on Beacon street is rapidly being pushed forward under direction of Mr. S. D. Greene, electrical engineer of the Sprague Company. The poles on this line will all be of iron, of a neat and tasteful design, and tested up to 1,400 pounds. These poles will be set in concrete, which will prevent all possible danger of their changing position or coming down. The cars, which will be all new, are now being built in Newburyport and will be ready for shipment shortly. It is expected that the road will be in operation within a month.

### The Waterhouse Arc Lamp.

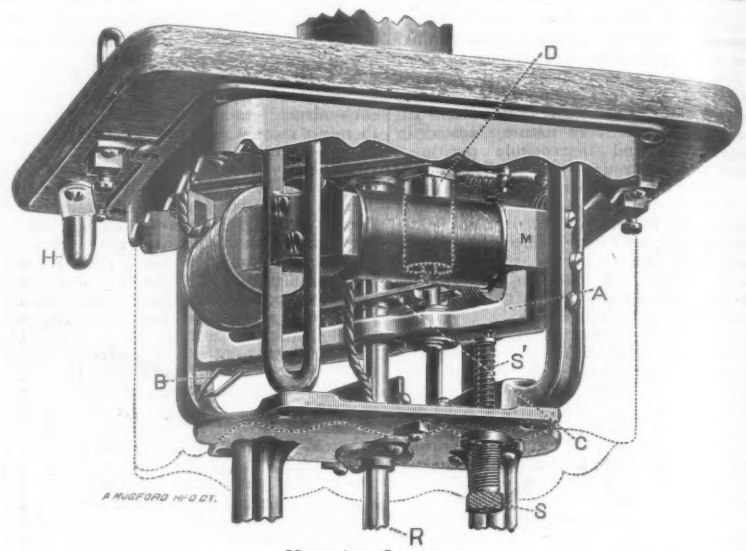
The Waterhouse arc lamp manufactured by the Waterhouse Electric & Manufacturing Co., of Hartford, Conn., which we illustrate, has a lamp magnet which differs from all others and is covered by letters patent (broadly) No. 345,937.

Referring to the cut, the magnet *M* is quadrangular in shape, having two independent circuits wound at right angles from each other, which produces upon the magnet two poles of constant polarity and two poles of variable polarity. Under the variable poles an armature is pivoted and the same is held in position by the pivot, supports *B* and spring *S'*, when no current is passing through the lamp. Movement to the carbon rod *R* is imparted by clutch *C*, which is attached to the armature *A*. To prevent a sudden upward movement of the armature the air dash pot *D* is used, and the spring *S'* prevents a sudden downward movement of the armature. The resistency of the spring *S'* is changed by the means of the screw *S*, and it is this adjustment which is outside the bonnet of the lamp, which regulates the length of the arc, for by changing the tension of the spring the position of the armature is slightly changed and the clutch binds the carbon rod *R* in accordance with the changes in the spring *S'*.

The variable poles, as will be seen, become variable in the following manner by changes of the resistance in the arc of the lamp. The current coming to the lamp enters same through terminal near handle *H*, passes to the main conductors and then to the carbon rod *R* through the carbons, and leaves the lamp at the terminal on the opposite of the lamp board. This produces magnetism in the variable poles of the magnet *M*, the tongue of the armature *A* is drawn up into the elongated hole of the magnet, and the movement of the armature binds the clutch to the carbon rod and the arc is formed. So soon as the excess of resistance is greater in the main than in the shunt coils, a portion of the current is diverted through the shunt, neutralizing the magnetism in the variable poles of the magnet, for the magnetism in the variable poles of the magnet is the sum of the difference between the shunt and the main. The neutralizing effect of the current passing through the shunt coils permits the armature *A* to recede slightly by gravitation, which eases up on the clutch *C*, and the carbon rod *R* feeds the carbons. On the end of the armature *A* above the supports *B* (not shown) the surface is rounding, and as the armature is drawn up away from the supports *B* it is free from any mechanical friction and directly susceptible to changes in the magnetism in the magnet *M*.

There are but few parts to wear out in this lamp, it being very simple in construction, and the makers claim the usual fine adjustment of arc lamps is not required. The lamp is thoroughly insulated throughout and convenience for easy trimming, as well as the small details, have had the careful attention of the makers.

The same form of magnet is used in the Waterhouse rack feed lamps, and also in the double lamps furnished by the company.




NEW ARC LAMP.

## ELECTRIC WELDING.

ORDNANCE DEPARTMENT, U. S. A. REPORTS OF TESTS BY TENSION OF BARS JOINED BY ELECTRIC WELDS, AT THE TESTING MACHINE, U. S. ARSENAL, WATERTOWN, MASS.

| Test No. | Marks. | Metal. | Total Length | Sectional Areas. At Weld. | Sectional Areas. Of Bar. | Tensile Strength. Total Lbs. | Tensile Strength. Lbs. sq. in. in bar. | Position of Fracture. | Appearance of Fracture | Remarks. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Ins. | Inches. Sq. In. | Inches. Sq. In. | | | | | |
| 4695 | ... ... | Wrt. Iron. | 31.75 | 1.74 diam. = 2.39 | 1.50 diam. = 1.77 | 76,640 | 45,070 | 3½ in. from middle of weld .... | Fibrous gr. spot at circ. | Weld finish'd with ham'er |
| 4696 | ..... | " | 36.25 | 1.22 " 1.17 | 1.24 " 1.21 | 57,900 | 49,500 | At weld | Gr | " " " |
| 4697 | ..... | " | 36. | 1.00 " 7.85 | 1.00 " 7.85 | 42,960 | 54,380 | 3 inches from weld | Fibrous | " " " |
| 4698 | ..... | " | 11.9 | Not welded ..... | 1.02 × .40 = .408 | 31,920 | 53,730 | .... | " | Has been heated at middle |
| 4699 | ..... | " | 11.9 | " . . . | 1.02 × .40 = .408 | 21,840 | 53,530 | ..... | " | " " " |
| 4700 | ..... | " | 11.9 | " ..... | 1.02 × .40 = .408 | 22,780 | 55,830 | ..... | " | |
| 4701 | H. D. | " | 13. | 1.02 × .40 = .408 | 1.02 × .40 = .408 | 20,100 | 49,260 | At weld | " | |
| 4702 | H. D. | " | 12.8 | 1.02 × .40 = .408 | 1.02 × .40 = .408 | 21,020 | 51,520 | " ..... | " | |
| 4703 | H. C. | " | 12.8 | 1.17 × .48 = .562 | 1.02 × .40 = .408 | 21,820 | 53,480 | 3 inches from weld | " | |
| 4704 | H. C. | " | 12.9 | 1.14 × .45 = .513 | 1.02 × .40 = .408 | 21,810 | 53,480 | At weld | Dull fibrous, in part gr. | |
| 4705 | H. H. | " | 12.9 | 1.13 × .49 = .513 | 1.02 × .40 = .408 | 20,400 | 50,000 | " ..... | " and spongy | 12,000 lbs. comp. accid'tly appl'd before tension test |
| 4706 | H. H. | " | 12.9 | 1.18 × .51 = .602 | 1.02 × .40 = .408 | 22,240 | 54,510 | 2¼ inches from weld | Fibrous | |
| 4707 | W. | " | 12.8 | 1.18 × .47 = .555 | 1.02 × .40 = .408 | 21,780 | 53,380 | 3.7 " " | " | |
| 4708 | ..... | " | 12. | Not welded ..... | .50 diam. = .196 | 12,520 | 63,880 | ..... | " | Has been heated at middle |
| 4709 | ..... | " | 12. | " ..... | .50 " .196 | 11,160 | 56,940 | At the grip | " | " " " |
| 4710 | ..... | " | 12.2 | " ..... | .50 " .196 | 10,520 | 53,670 | ..... | " | " " " |
| 4711 | H. D. | " | 13.2 | .49 diam. = .189 | .50 " .186 | 7,690 | 39,230 | At weld .... | Dull fibrous, part of surface smooth | |
| 4712 | H. D. | " | 13.35 | .50 " .196 | .50 " .196 | 9,980 | 50,920 | " ..... | Dull fibrous, and spongy | Started fine crack at weld. Fractured at weld at the anvil by bending cold. Fibrous, part of surface smooth |
| 4713 | H. H. | " | 13.2 | .60 " .283 | .50 " .196 | 10,260 | 52,350 | 1½ inch from weld | Fibrous | |
| 4714 | H. H. | " | 13.2 | .60 " .283 | .50 " .196 | 10,280 | 52,450 | 1.6 " " | " | |
| 4715 | H. C. | " | 13.35 | .56 " .246 | .50 " .186 | 11,080 | 56,530 | 1.75 " " | " | |
| 4716 | H. C. | " | 13.2 | .61 " .292 | .50 " .190 | 10,270 | 52,400 | 1.8 " " | " | |
| 4717 | P. W. | " | 13.1 | .67 " .353 | .50 " .196 | 11,170 | 56,990 | 1.5 " " | " | |
| 4718 | P. W. | " | 13.2 | .67 " .353 | .50 " .196 | 10,060 | 51,330 | 1.7 " " | " | |
| 4719 | P. W. | " | 13.2 | .69 " .374 | .50 " .196 | 10,120 | 51,630 | 1.5 " " | " | |
| 4720 | ..... | " | 16.1 | Not welded ..... | .62 " .302 | 15,700 | 51,990 | ..... | " | |
| 4721 | ..... | " | 16. | " ..... | .62 " .302 | 17,980 | 59,540 | ..... | " | |
| 4722 | ..... | Octagonal Steel.. | 16. | " ..... | .66 " .360 | 45,800 | 127,220 | ..... | Fine gr. radiating from a spot at circumference | |
| 4723 | ..... | " | 16. | " ..... | .66 " .360 | 45,670 | 126,860 | At face of grips | Fine gr. radiating from a spot at circumference | |
| 4724 | ..... | " | 15.75 | .66 diam. = .360 | .66 " .360 | 27,500 | 73,390 | At weld | Coarse gr | |
| 4725 | ..... | " | 16. | .67 " .372 | .66 " .360 | 22,900 | 63,610 | " ..... | Coarse gr., yellow cast at circumference | |
| 4726 | ..... | " | 16. | .80 " .531 | .66 " .360 | 32,550 | 90,420 | At end of enlarged section of weld | Coarse gr | |
| 4727 | ..... | " | 16. | .78 " .502 | .66 " .360 | 37,800 | 105,000 | At end of enlarged section of weld | " | |
| 4728 | ..... | Octagonal Steel & Wrt. Iron | 16. | .65 " .332 | .63 " .328 | 17,100 | 52,130 | In iron, 3 in. from weld | Fibrous | |
| 4729 | ..... | " | 16. | .75 " .442 | iron .63 " .328 | 17,070 | 52,040 | " 2.3 " " | " seamy | |
| 4730 | ..... | " | 16. | .77 " .446 | .63 " .328 | 16,950 | 51,680 | " 2.8 " " | " ..... | |
| 4731 | ..... | Copper | 12. | Not welded ..... | .373 " .109 | 3,580 | 32,840 | ..... | ..... | |
| 4732 | ..... | " | 12. | " ..... | .373 " .109 | 3,540 | 32,480 | ..... | ..... | |
| 4733 | ..... | " | 12. | " ..... | .373 " .109 | 3,530 | 32,390 | ..... | ..... | |
| 4734 | D. | " | 11.75 | .380 diam. = .113 | .373 " .109 | 3,210 | 29,450 | At weld | ..... | |
| 4735 | D. | " | 11.80 | .380 " .113 | .373 " .109 | 3,390 | 31,100 | " ..... | ..... | |
| 4736 | D. H. | " | 11.8 | .372 " .109 | .373 " .109 | 3,470 | 31,830 | " ..... | ..... | |
| 4737 | D. H. | " | 11.8 | .379 " .113 | .373 " .109 | 3,590 | 32,940 | ¾ inch from weld | ..... | |
| 4738 | P. W. | " | 11.85 | .51 " .204 | .373 " .109 | 3,540 | 32,480 | ¾ " " | ..... | |
| 4739 | P. W. | " | 11.80 | .50 " .196 | .373 " .109 | 3,570 | 32,750 | .85 " " | ..... | |
| 4740 | ..... | Brass | 12. | Not welded ..... | .374 " .110 | 5,240 | 47,640 | ..... | ..... | Has been heated at middle |
| 4741 | ..... | " | 12. | " ..... | .374 " .110 | 5,275 | 47,950 | ..... | ..... | Have been heated at middle |
| 4742 | ..... | " | 12. | " ..... | .374 " .110 | 5,240 | 47,640 | ..... | ..... | |
| 4743 | D. | " | 11.8 | .375 diam. = .110 | .374 " .110 | 4,490 | 40,820 | At weld | ..... | |
| 4744 | D. | " | 11.8 | .375 " .110 | .374 " .110 | 5,350 | 47,730 | ¾ inch from weld | ..... | |
| 4745 | P. W. | " | 11.9 | .50 " .196 | .374 " .110 | 5,270 | 47,910 | ¾ " " | ..... | |
| 4746 | P. W. | " | 11.8 | .50 " .196 | .374 " .110 | 5,270 | 49,910 | .80 " " | ..... | |
| 4747 | ..... | Brass & Wrt. Iron | 10.8 | .374 " Brass | .374 " .110 | 1,920 | 17,450 | At weld | ..... | |
| 4748 | ..... | " | 11.5 | .374 " Brass | .374 " .110 | 3,690 | 33,550 | " ..... | ..... | |
| 4749 | ..... | Steel and German Silver | 9.15 | .33 " .086 | .250 " .049 | 1,980 | 40,410 | " ..... | ..... | |
| 4750 | D. | Copper | 11.9 | .378 " .112 | .373 " .109 | 3,520 | 32,290 | " ..... | ..... | |
| 4751 | P. W. | Wrt. Iron | 13.35 | .68 " .363 | .50 " .196 | 11,420 | 58,370 | 1.3 inch from weld | Fibrous | |
| 4752 | P. W. | " | 13.15 | .70 " .385 | .60 " .196 | 10,410 | 53,110 | 1.7 " " | " | |
| 4753. | A chain made of three links of 50 in. diam. wire. Two welds in each link at the sides. Tensile strength, 17,900 lbs. Fractured middle link in the quarter 1.60 in. from weld. Appearance fibrous. | | | | | | | | | |
| 4779 | 1 L. | Steel ..... | 15.6 | .504 diam. = .200 | .503 diam. = .199 | 15,290 | 76,830 | At weld | Gr. medium coarse | |
| 4780 | 2 | " | 15.4 | .62 " .302 | .500 " .196 | 21,700 | 110,710 | 8 inches from weld | Gr. fine, dull center | |
| 4781 | 8 | " | 14.1 | .500 " .196 | .498 " .195 | 14,590 | 74,820 | At or near weld | In part smooth and part gr | |
| 4782 | C. | " | 18.1 | Not welded ..... | .502 " .198 | 18,900 | 75,450 | Near end of heat'd sec'n | Fine gr., dull center | |
| 4783 | H. | " | 15.25 | .62 diam. = .302 | .500 " .196 | 20,420 | 104,180 | 9 inches from weld | " " | |
| 4784 | C* | Octagonal Steel.. | 19.6 | .82 " .557 | .55 " .250 | 31,190 | 124,760 | At weld | Dull spongy, irregular dark spots | |
| 4785 | D. | " | 19.8 | .58 " .278 | .55 " .250 | 33,580 | 134,320 | " ..... | Gr. medium coarse | |
| 4786 | H. D. | " | 19.7 | .55 " .250 | .55 " .250 | 32,350 | 129,400 | 3 inches from weld | Fine gr. rad. from dull spot at circ. | |
| 4787 | H. D. | " | 19.8 | .55 " .250 | .55 " .250 | 33,700 | 134,800 | At weld | Gr. medium coarse | |
| 4788 | ..... | Steel ..... | 16. | Not welded ..... | .62 " .302 | 19,610 | 64,930 | ..... | Fine silky | |
| 4789 | P. W. | " | 15.9 | .80 diam. = .503 | .62 " .302 | 19,490 | 64,540 | 9 inches from weld | " ..... | |
| 4790 | D. | " | 15.8 | .62 " .302 | .62 " .302 | 19,020 | 62,980 | At weld | Gr. medium coarse | |
| 4791 | ..... | Wrought Iron | 16.1 | Not welded ..... | .63 " .312 | 16,360 | 52,440 | ..... | Fibrous | |
| 4792 | H. D. | " | 16.1 | .63 diam. = .312 | .63 " .312 | 16,280 | 52,180 | At or near weld | " light colored at circ | |
| 4793 | D. | " | 16. | .63 " .312 | .63 " .312 | 16,160 | 51,790 | " " | " ..... | |
| 4794 | H. | " | 16.25 | .72 " .407 | .63 " .312 | 16,750 | 53,690 | 2.4 inches from weld | " seamy | |
| 4795 | H. D. | " | 16.25 | .76 " .454 | .76 " .454 | 24,550 | 54,070 | At weld | Gr. at circ., dull center | |
| 4796 | H. | " | 16.1 | .88 " .608 | .76 " .608 | 25,590 | 42,100 | 2 inches from weld | Fibrous | |
| 4797 | H. | " | 16.4 | .81 " .515 | .76 " .515 | 25,390 | 49,300 | 2 " " | " ..... | |
| 4798 | H. D* | Steel ..... | 15.5 | .509 " .203 | .502 " .198 | 15,300 | 77,270 | At or near weld | Gr. medium coarse | |

*Correct.*
J. E. HOWARD.

F. H. PARKER,
*Lieut.-Col. Ordnance Dept., U. S. A., Commanding.*

## Electric Light on a Steamer.

Among the recent installations of the U. S. Electric Lighting Company, of New York, is that of the steamer "Connecticut," of the Providence & Stonington Steamship Company's line. The utmost care was used in the arrangement of the plant, and it is pointed to as a representative one. The newest form of the U. S. Company's dynamo was used, of which we present an end view in Fig. 1. The new straight filament lamp, shown in Fig. 3, was used to the number of 800, all of 16 candle power.

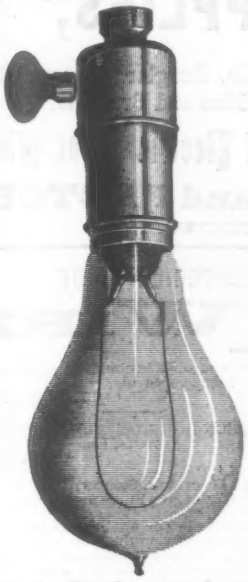


FIG. 3.—THE STEAMER LAMP.

The dynamos are run by engines of the Brotherhood three-cylinder type, each capable of delivering 45 horse-power, and arranged to run at a speed of about 950 revolutions per minute. This permits the coupling of the engine direct to the dynamo shaft, without the use of gearing or pulleys, thus making an extremely compact design. The connection is made by means of an ingenious flexible coupling, especially designed for this purpose, and great stiffness and stability is obtained by having both engine and dynamo fastened to the same bed-plate. This arrangement further secures economy of space and weight, and very little noise in running.

In order to avoid any possible annoyance to the passengers, the machinery is located in the hold forward, and in putting it in place every precaution has been taken to provide against vibration, and against the humming which is so often complained of with electric light plants. The foundations are composed of two layers of 4-inch yellow pine planks securely fastened to the keelson; a layer of felt is placed between the two layers of plank, and another between the upper layer of plank and the iron bed-plate of the machinery. At the switchboard, the two dynamos, each of 400 light capacity, are coupled in parallel, each dynamo main having an ampere meter in circuit to show the load. On the same board there is also placed a cardew voltmeter and the rheostats. There are also in the engine room duplicates of all these instruments, so that the engineer can at all times tell whether the man who is running the dynamos is properly attending to his duties; as a further precaution, an indicator is placed in the stateroom of the chief engineer, so arranged that at any time in the night, by merely turning a switch, he can tell whether the plant is being properly cared for. The greatest care has been given to every detail of the wiring system, in order to provide against and overcome the many difficulties attendant on maintaining the insulation of an electric light system on shipboard at a high point; also to provide against any unforeseen difficulty which may arise. A very high insulation wire has been used throughout, and all the wires used below deck have been encased in lead, then covered by wooden mouldings. The wiring is entirely concealed, none of it being visible in any part of the boat outside of the engine room.

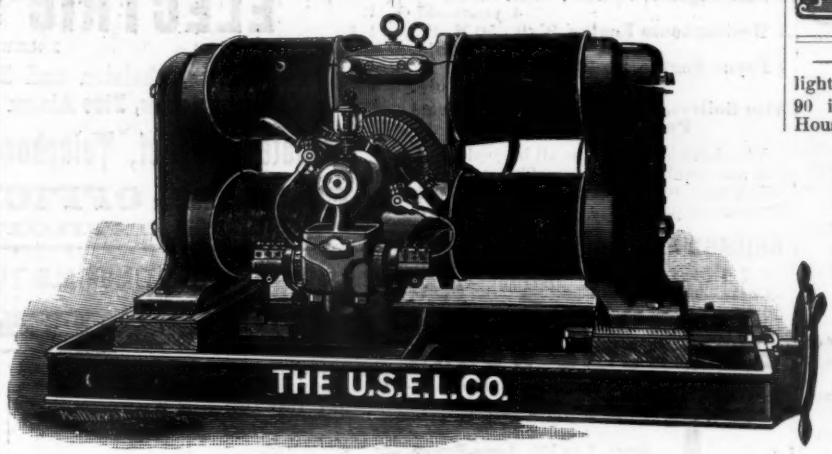



FIG. 2.—SIDE VIEW OF SAME.

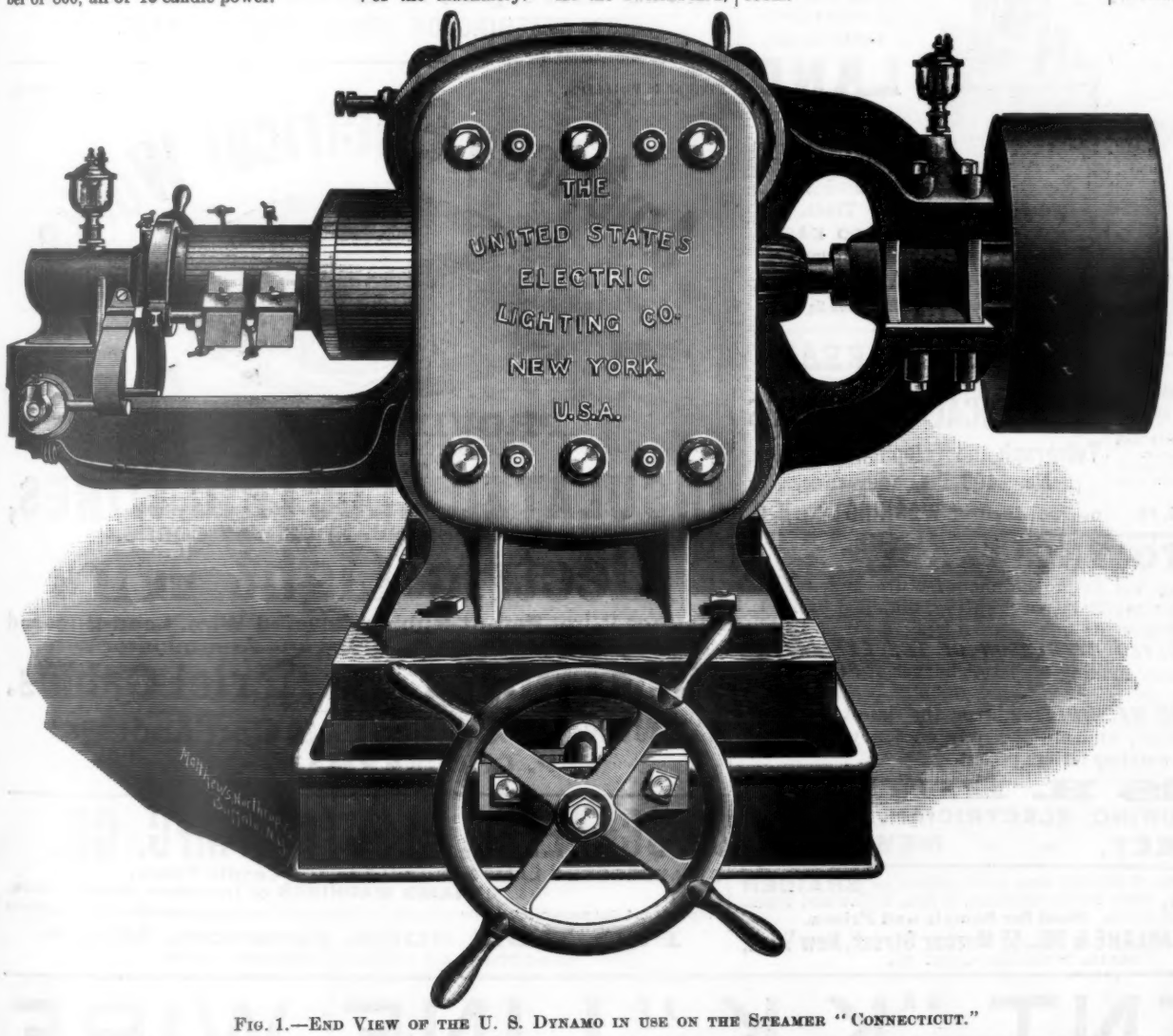



FIG. 1.—END VIEW OF THE U. S. DYNAMO IN USE ON THE STEAMER "CONNECTICUT."

The safety devices, lamp-sockets, switches, etc., have all been carefully designed for this special plant, and in designing them pains have been taken to prevent the exposure of anything which may interfere with or disfigure the decorations of the boat. Care has also been taken to so arrange the system that it will require as little attention as possible while in operation, and the power required from the engines is governed by the number of lights in use.

## ELECTRIC LIGHT NEWS

—— At Northampton, Mass., the electric light company has made a contract to put 90 incandescent lights into the Mansion House.

—— The electric railway project in Bridgeton, N. J., has assumed more definite shape, and is now said to be certain of accomplishment. Stock aggregating $10,000 has been taken or pledged.

—— The Holyoke, Mass., Electric Light Company's construction force are at work setting the poles and stringing the wires for the new system of incandescent lighting which many of the business men are to adopt.

—— A large electric light and power installation is about to be erected at Toulouse. The requisite power will in the first place be derived from water motors, the site of which is in the center of the town. The fall available will furnish 2,000 horse power.

—— The Thomson-Houston Electric Light Company assumes control of the Plymouth, Mass., Electric Light Company's plant and lights. A new brick station will be built, and a plant for 500 incandescent lamps will be added to the arc lights now in use.

—— At Westfield, Mass., the electric light people expect to move their dynamos from the present building on Orange street to the new and commodious brick building on the gashouse premises this week. More dynamos will be added, and an independent incandescent plant put in. The seventeen new arc lights in various parts of the town will then be started up.

—— A Brattleboro (Vt.) correspondent sends the following: "The electric light plant is in working order, and the entire system for street lighting was used for the first time last Thursday evening. The lights form a part of the works of the Brattleboro Gas Company, of which Dr. H. D. Holton is president and Charles F. Thompson secretary and treasurer, with Andrew Horton in charge of the gas department and Walter Fuller of the electric department. The electric light works are located in a 65x15 annex to the Fletcher Mill, built especially for the company, and are fitted for use with both water and steam power. The machinery throughout is of the highest grade. The engine is 75 horse power, made by the Ball Engine Company, of Erie, Pa. The Lincoln Iron Works of Rutland, H. A. Patrick, superintendent, furnish the boiler, which is of 100-horse power, of an upright pattern."

—— The Woonsocket, R. I., Electric Light Company has at present five engines of 500 horse power. Under a full head of water the water wheel has 250 horse power. There are three 2,000 candle power arc dynamos in daily service to run the street lights, and one in reserve. In addition to the street light dynamos there are three 1,200 candle power arc dynamos to run the arc store lights, and five 400 light incandescent dynamos. The company has in service 79 street lights, the town paying for 77, the company maintaining two at their own expense, one on the top of their office and one on the Bernon street bridge. There are 79 commercial lights in use and 1,500 incandescent. Of electric motors there are 21, ranging from one-eighth to fifteen horse power. In addition to these there are twelve series lights on arc circuits, each of 65 candle power.

# ELECTRICAL PATENTS

(Copies of any Patents in the following List will be sent to any address on receipt of twenty-five cents.)

INDEX OF INVENTIONS FOR WHICH LETTERS PATENT OF THE UNITED STATES WERE GRANTED IN THE WEEK ENDING OCTOBER 15, 1888.

391,437 Electric potential differentiator; Elihu Thomson, Lynn, Mass.

391,446 Clock synchronizer; Arthur G. Wiseman, Webster Grooves, Mo.

391,447 Electric Railway; Parvin Wright, Denver, Colo.

391,468 Automatic circuit changer for secondary batteries; William W. Griscom, Haverford College, Pa.

391,477 Arc lamp; Hosea W. Libbey, Boston, Mass.

391,505 Galvanic battery; Horatio J. Brewer, New York, N. Y.

391,512 Electric switch; William B. Cleveland, Cleveland, Ohio.

391,517 Electric cable joint; Joseph E. Cuff, Denver, Colo., assignor of one-half to Moses L. Stern, same place.

391,542 Machine for making battery plates; Albert F. Madden, Newark, N. J., assignor to the Electrical Accumulator Company of New York.

391,547 Electrical continuity vibrator; George F. Milliken, Boston, Mass., assignor to the Gamewell Auxiliary Fire Alarm Company, same place.

391,568 Railway train indicator; Benjamin E. Waters, Brockton, assignor of one-half to Moses E. Hatch, New Bedford, Mass.

391,587 Conduit for electric wires; Madison Dallas, New Orleans, La.

391,590 Electric Motor; John Doyle, Hoboken, N. J., assignor to himself and C. Coles Dusenbury, Lake Mahopac, N. Y.

391,592 Electric measuring instrument. 391,593 Automatic commutator for alternating electric currents. 391,594 Arc extinguisher for electric switches or cut-outs; Arthur H. Eddy, Hartford, Ct.

391,595 System of electric lighting. 391,596 Incandescent electric lamp; Thomas A. Edison, Menlo Park, N. J.

391,605 Cable hanger; Edward J. Hall, Buffalo, N. Y.

391,761 Electric arc lamp; Samuel E. Nutting, Chicago, Ill.

391,762 Telephone Exchange system; Charles E. Scribner, Chicago, Ill.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**FOR SALE.**

1 Buckeye Engine, 17"x30", 180 H. P., 1½ years old.
1 N. Y. Safety Engine, 13"x12", 90 H. P., 2 years old.
1 N. Y. Safety Engine, 12"x12", 60 H. P., 6 years old.
5 Ball Engines, 10"x12", 60 H. P., 4 years old.
1 Westinghouse Engine, 9"x9", 50 H. P., 4 years old.
1 Payne Engine, 8"x10", 35 H. P., 5 years old.
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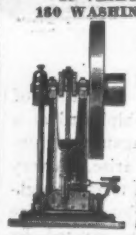

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NEW YORK OFFICE, 63 WALL STREET.
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*A. F. MASON, Esq.*,
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Boston, Mass.

Dear Sir:

I have been using the Simplex Wire on a large portion of our lines in Richmond, Va., for the past five months. I have taken daily tests of the insulation during that time. The longest single circuit I have is about five miles, and at no time has the insulation test ever been less than one megohm. I cannot speak too highly of the wire or its insulation. A large portion of it has been run through foliage and trees in the streets, and upon examination a few days ago I failed to find any place where the wire has been abraded by coming into contract with the branches of trees. My instrument does not measure over one meghom, and I cannot tell how much higher the insulation may have measured. One megohm on wires in circuit is euough for me.

Yours very truly,
W. H. COLE, *Superintendent.*

THOMSON-HOUSTON ELECTRIC CO.,
AUGUSTA, GA.
August 12th, 1888.

*Dr. A. F. MASON,*
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Dear Sir:

We are using in our arc-lighting circuits about twerty (20) miles of your Simplex T. Z. R. wire.

We have feund the insulation a most perfect protection against moisture and the abrasion of small tree limbs.

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